

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

1
ag 84F
89

LIBRARY
RECEIVED
★ MAR 18 1939 ★
U. S. Department of Agriculture

U. S. DEPARTMENT OF
AGRICULTURE

FARMERS' BULLETIN No. 1409 *sl. rev. Feb. 1939*

TURKEY
RAISING



TURKEY RAISING is usually carried on as a side line on general farms, though in some parts of the United States it constitutes the chief source of revenue from farming.

The number of turkeys in this country decreased for a time after the 1890 census, but during recent years the industry has been growing, largely because of improved methods of controlling turkey diseases and better methods of management.

This bulletin has been prepared primarily to inform those interested in turkey raising on modern methods of management. Most of the recommendations are adaptable to both small and large scale production.

Washington, D. C.

Issued April 1924
Slightly revised February 1939

TURKEY RAISING

By STANLEY J. MARSDEN and ALFRED R. LEE, *associate poultry husbandmen,*
*Animal Husbandry Division, Bureau of Animal Industry*¹

CONTENTS

	Page		Page
The turkey industry of the United States.....	1	Raising poults—Continued.....	21
Varieties.....	2	Sanitation.....	21
The Bronze.....	3	Litter.....	22
The White Holland.....	4	Early development.....	22
The Bourbon Red.....	4	Marking.....	23
The Narragansett.....	4	Feeding growing turkeys.....	23
The Black.....	5	Feed consumption and cost of growing.....	28
The Slate.....	6	Equipment for raising turkeys.....	30
Standard weights of turkeys.....	6	Containers for feed and water.....	30
Selecting breeding stock.....	6	Houses and fences.....	33
Managing breeding stock.....	8	Protection against dogs.....	36
Breeding pens or enclosures.....	8	Devices that prevent tail-feather picking.....	36
Mating.....	9	Range management of growing turkeys.....	37
Egg production.....	10	Fattening turkeys for market.....	38
Care of hatching eggs.....	11	Marketing turkeys.....	39
Feeding.....	12	When to market.....	39
Combating diseases and pests.....	14	Selecting birds for market.....	40
Incubating turkey eggs.....	16	Withholding feed before slaughter.....	40
Natural incubation.....	17	Killing and picking.....	40
Artificial incubation.....	17	Cooling.....	42
Raising poults.....	18	Packing.....	43
Brooding.....	19	Dressed-turkey grades.....	43

THE TURKEY INDUSTRY OF THE UNITED STATES

TURKEY RAISING has long been an important enterprise in the United States because great quantities of turkey meat are required annually and its use throughout the year is becoming more popular. Producers should endeavor to make turkey raising more profitable by overcoming heavy losses from diseases that heretofore have been a serious handicap.

The enterprise is very adaptable, extending to practically all parts of the United States. The more important areas of production are the Middle Western, Northwestern, and Southwestern States, where large numbers of small flocks are raised annually on farms and ranches and where there are also many large commercial flocks. The number of turkeys in this country began to decrease about 1890, but by 1910 interest in turkey raising revived, and in recent years the industry has been growing, largely because of increased knowledge of blackhead disease and its control.

According to the census there were 3,688,000 turkeys on farms in the United States in 1910 and about the same number in 1920. The 1930 census showed 16,794,000 turkeys, but this was the number raised to market age instead of the number of breeding turkeys kept.

¹ This publication is a revision of former editions prepared by M. A. Jull, senior poultry husbandman, and A. R. Lee.

This new census figure provides a much better measure of the industry's actual size. The 1930 figure indicates a moderate increase between 1920 and 1930 in the number of breeding turkeys kept. The nine States leading in turkey production, as shown by the 1930 census, are Texas, North Dakota, Minnesota, California, Oklahoma, Oregon, Colorado, Virginia, and Idaho.

Where conditions are suitable and proper methods of management are followed turkeys can be raised successfully with very simple equipment; therefore the capital outlay in the enterprise may be quite small. Except during the growing season managing the flock is fairly simple. Of course, constitutional vigor must be maintained in the breeding stock; the flock must be kept relatively free from disease; and the soil, especially where the poults are fed, must be kept

sanitary. Moreover, turkeys, even when well fed, will make good use of at least a limited range and in doing so will destroy many injurious insects, eat great quantities of succulent green feed, and pick up much waste grain, weed seeds, and other sources of nutriment. This fact reduces the cost of production and increases the profits.

VARIETIES

All domestic varieties of turkeys have descended from the North American wild stock, comprising the eastern wild turkey, which ranged over the eastern part of the United States from

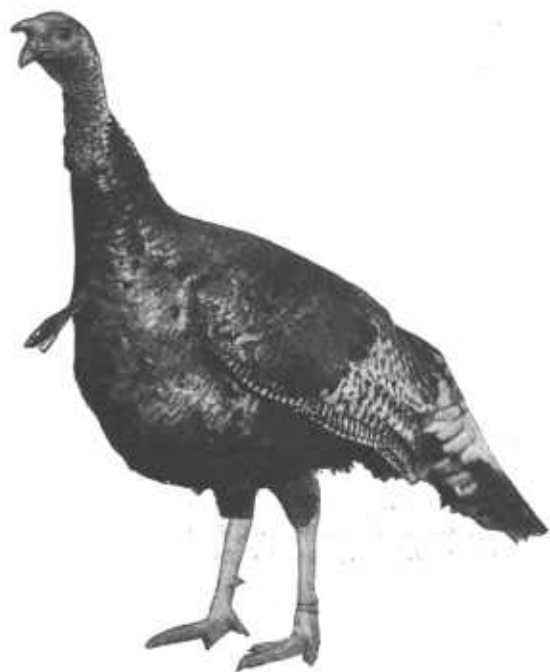


FIGURE 1.—Bronze turkey, male.

Maine to Florida; the Florida wild turkey, which ranged over southern Florida; the Rio Grande wild turkey, which ranged over southern Texas and northwestern Mexico; and the Mexican wild turkey, which ranged over Arizona, western New Mexico, southern Colorado, and Mexico. It is probable, however, that these four wild turkeys were of common origin and that most of our domesticated varieties, especially the Bronze, have descended from the Mexican wild turkey.

Six standard varieties of domestic turkeys are recognized by the American Poultry Association, an organization having as its primary function the promotion of standard qualities in all breeds and varieties of poultry in North America. The association publishes the

Standard of Perfection, which contains concise descriptions of breeds and varieties of poultry, with illustrations of the most important ones.

The following is a brief description of each of the six varieties, namely, the Bronze, White Holland, Bourbon Red, Narragansett, Black, and Slate.

THE BRONZE

The Bronze, often called the Mammoth Bronze, is the heaviest and also the most popular variety. The male (fig. 1) is distinguished by (1) the rich, iridescent, red-green sheen of the plumage on the neck, wing bows, wing fronts, wing coverts, breast, front half of the back, and lower thighs; and (2) the lighter, brilliant, copper-colored bronzing of the rear half of the back, tail coverts, tail itself, and body. The bronzing in the tail, tail coverts, and body is bordered by a distinct narrow black band, which in turn is bordered by a wide edging of pure white. The rear portion of the back has the broad

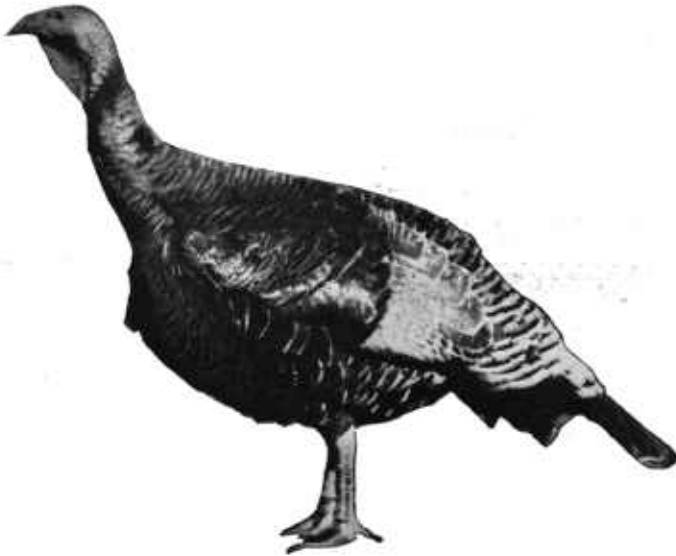


FIGURE 2.—Bronze turkey, female.

bronze bar with the narrow edging of black but does not have the white tips. The plumage of the female (fig. 2) is similar to that of the male, except for an edging of white on the black bars on the back, wing bows, wing coverts, breast, and body. This white edging is narrow in the front of the body and gradually widens toward the rear. Both sexes have the same color pattern in the large wing feathers and in the main tail feathers and coverts. The main tail feathers and coverts have brown penciling (narrow bars) on a dull black background; the large wing feathers are evenly barred with black and white, the bars of the secondaries becoming indistinct as the back is approached. Creaminess, yellow, or yellowish brown in

the pure white edging of the main tail feathers and coverts of the Bronze indicates an admixture of wild-turkey blood and is a serious defect in the standardbred Bronze. Lack of the copper-colored bronzing or a tendency for it to be greenish is also a serious color defect.

THE WHITE HOLLAND

The White Holland (fig. 3) probably originated as a "sport" from the Bronze or the wild turkey. Its plumage should be pure white in color and free in all sections from black flecking or ticking. The shanks and toes in this variety should be pinkish white.

THE BOURBON RED

The Bourbon Red male (fig. 4) is of a rich, deep brownish-red color in all sections except the wings, tail, and breast. The primaries and secondaries of the wings are pure white, and the main tail feathers are pure white except for an indistinct bar of red crossing each feather near the end. The breast feathers are red with a very narrow edging of black. The color of the female is similar to that of the male, but there is a very narrow edging of white on the tips of the breast feathers. More than one-third of any other color except white showing in the large feathers of the wing or tail constitutes a standard disqualification in this variety. The rich reddish color, without some black, is rather difficult to obtain and this black ticking or flecking is a rather common fault. A faded red, approaching buff, is also undesirable.

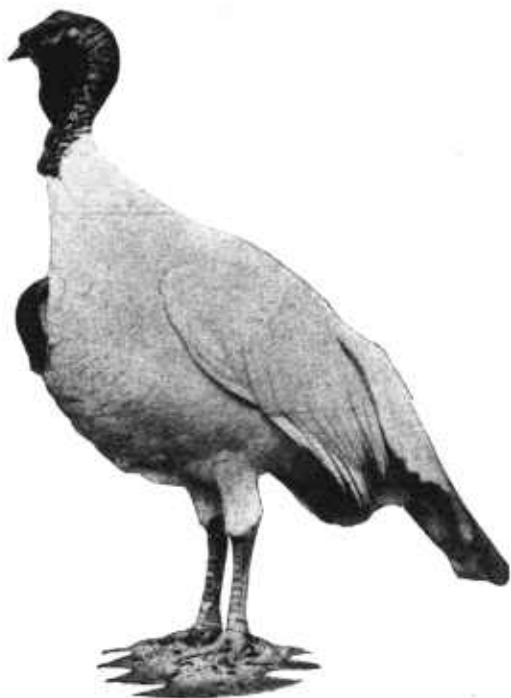


FIGURE 3.—White Holland turkey, male.

THE NARRAGANSETT

The Narragansett (fig. 5) generally resembles the Bronze in color pattern, but has no iridescent red-green sheen and no bronzing. The Narragansett colors are metallic black with light steel-gray edging and barring bordered, in certain sections, by a narrow black band on the end of the feathers. The plumage, as a whole, has a dark background of metallic black with a broad, light steel-gray edging, show-

ing more of the light color in this edging as the body is approached. In the male, the colors of the wing fronts, wing bows, and wing coverts are the reverse of the colors found elsewhere, being light steel gray, ending in a narrow band of black. The wing coverts form a broad silvery bar across the folded wings. The neck and saddle are black, ending in a broad steel-gray band. The back is rich metallic black, free from bronzing. The breast, body, and fluff are black, the feathers ending in a broad silvery-gray band edged with black. The large wing and tail feathers and the primary coverts are barred with black and white similarly to those of the Bronze, the barring of the upper secondaries becoming indistinct as the back is approached.

The plumage of the female is similar to that of the male in this variety, except that an extra edging of silvery gray is added to the ends of the feathers on the back, wing bows, wing coverts, breast, and body. The light edging should be narrow toward the front

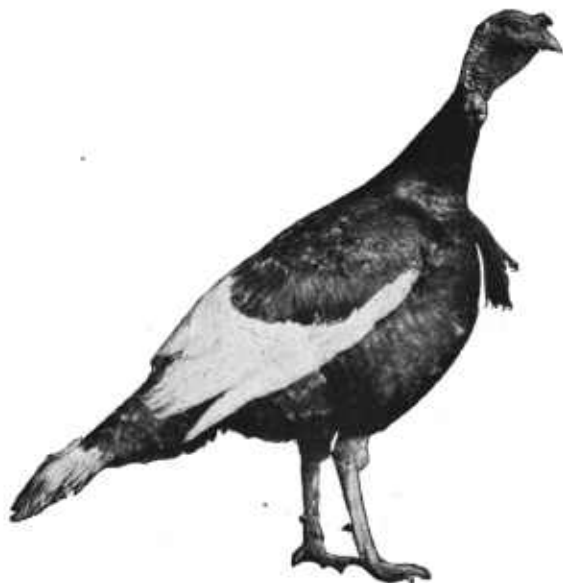


FIGURE 4.—Bourbon Red turkey, male.

of the bird and broader toward the rear. The female in general presents a lighter appearance than the male. There should be a rich metallic black but no bronze barring in either sex. The offspring of a Narragansett mating sometimes have a bronze color, but such birds should not be kept for breeders.

THE BLACK

The Black (fig. 6), known in England as the Norfolk turkey, is lustrous greenish black in all sections of the plumage. Objectionable white tipping in the feathers of young turkeys of this variety often disappears after the first molt. Any variation from the solid black color should be carefully avoided in breeding this variety. The shanks and toes should be pink in mature birds and almost black in young birds.

THE SLATE

The Slate (fig. 7) has an ashy-blue or slate-colored plumage, sometimes dotted with tiny black spots, which are undesirable. Feathers of any other color, such as white, buff, or red, constitute a standard disqualification. This variety does not breed true to color, and many of the offspring have both solid white and solid black as well as black-and-white ticking and splashing. The shanks and toes should be pink.

STANDARD WEIGHTS OF TURKEYS

The standard weights of the different varieties of turkeys as given in the Standard of Perfection are given in table 1.

TABLE 1.—*Standard weights of turkeys at various ages*

Variety	Adult cock (2 years old or over)	Yearling cock (1 year old and less than 2)	Cockerel (less than 1 year old)	Hen (1 year old or over)	Pullet (less than 1 year old)
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Bronze.....	36	33	25	20	16
White Holland.....	33	30	23	18	14
Bourbon Red.....	33	30	23	18	14
Narragansett.....	33	30	23	18	14
Black.....	33	30	23	18	14
Slate.....	33	30	23	18	14

SELECTING BREEDING STOCK

The breeding stock is the foundation of the turkey industry, and the greatest care must be used in selecting both male and female

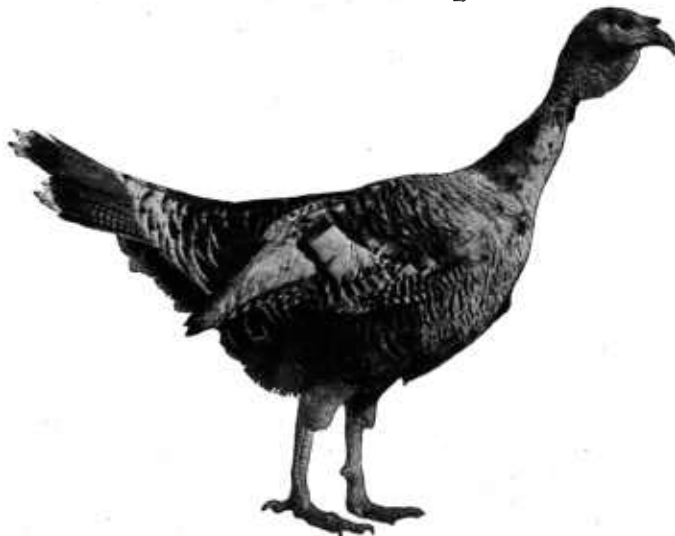


FIGURE 5.—Narragansett turkey, female.

breeders. Failure in this respect has undoubtedly been one of the principal reasons why satisfactory results have not been obtained on many farms and commercial plants. One of the first steps in

improving conditions, therefore, is more careful selection of the breeding stock.

The most satisfactory time of the year to select breeding stock is in November or December, especially before large numbers of turkeys are sold for the Thanksgiving and Christmas markets. Selecting



FIGURE 6.—Black turkey, male.

birds early in the season makes possible a choice from a larger number and, what is more important, saves the best-developed and most vigorous birds for breeding instead of marketing them. New blood may be introduced into the flock or a beginning with turkeys may be made by obtaining hatching eggs, day-old poults, or breeding stock, but the purchase of eggs or poults is recommended. New breeding stock should be treated for worms and lice and should be quarantined for 2 or 3 weeks to detect any disease.

Turkeys are raised for meat rather than for egg production. The breeders, therefore, should have compact, meaty bodies. The breastbone should be straight, the back broad, especially at the shoulders, and the breadth carried well back toward the tail. The body should be deep, with the breast so broad, full, and well rounded that the breastbone does not protrude prominently. Other important points are full, bright eyes, a broad head, and stout legs set well apart and rather short. Above all else, the birds should be vigorous. When pedigrees and performance records of the birds' ancestors are available, selection should be based on fertility, hatchability, livability, early maturity, and other desirable factors, as well as on the physical points mentioned above.

It is wise to select or build up a flock of purebred turkeys. It costs no more to raise purebred stock than mongrels and the pure-

breeds are usually heavier and command higher market prices. Also, if good standard qualities of shape and color are maintained, some of the birds can be sold for breeding purposes at increased prices.

MANAGING BREEDING STOCK

Results in turkey raising depend to a large extent on the kind of breeding stock used each year and the manner in which it is managed.

BREEDING PENS OR ENCLOSURES

Until a few years ago breeding flocks were ordinarily allowed free range throughout the breeding and laying season (fig. 8). This practice often gives unsatisfactory results because the nests cannot be found readily and therefore the eggs cannot be gathered daily.

Many breeding flocks are now kept in good-sized breeding pens or enclosures with nests conveniently located inside or outside the roosting shed (fig. 9). For a pen of 12 to 18 birds a yard of 10 to 15 square rods is large enough. Frequently an orchard is very satisfactory. A hog-proof fence about 6 feet high will confine the turkeys; they are not likely to fly over the fence, because they cannot rest on the top wire. Fences should be tightly stretched and should be dogproof, because dogs and coyotes are very destructive in turkey flocks. Solid-top fences, gates, and buildings less than 9



FIGURE 7.—Slate turkey, male.

feet high should be topped with strips of poultry fence 3 feet wide to prevent turkeys from perching on them. If turkey hens persist in flying over the fence the flight feathers of one wing may be cut, but the wing of a breeding male should never be clipped, as the clipping may interfere with mating.

Sanitation in the breeding yards must not be neglected. Either the fences and shelters should be made portable and moved each year to clean ground, or double yards should be constructed for use only in the breeding season, during which time one yard is occupied for 2 successive weeks and then the other, which in the meantime has been kept free of all poultry.

If two or more breeding pens are maintained, they must be isolated from each other. This can be done with double fences, 12 feet or more apart, or with single fences built solid for about 3 feet above the ground, so that the turkeys cannot see those in other pens.

MATING

Best results in mating are obtained when from 10 to 15 females are mated to 1 male, although as many as 18 hens can be mated to 1 young tom under favorable conditions. As a rule good fertility will result when several toms are kept with a flock of hens. However, if the toms are quarrelsome and mating is seriously interfered with the males must be alternated, 1 tom being allowed to run with the hens 1 day and another tom the next day. Surplus toms should be penned out of sight of the breeding birds.



FIGURE 8.—Breeding flock of Bronze turkeys on free range.

The soundest breeding program is one of using yearlings and 2-year-old hens which have been selected as breeders after they have passed through one full breeding season successfully. However, if pedigreeing can be done, it is practicable to use well-matured pullets selected from parents that lived through their first breeding season and showed good production, fertility, hatchability, and poult livability. The breeding males may be young or old but, in general, well-matured young toms give better results. Proved sires, of course, are valuable and can well be used so long as they will breed. Reserve breeding toms should always be kept, especially when older toms are used, as the latter are sometimes sterile. The spurs of a yearling or older tom should be trimmed smooth, as should the toenails of all breeding males, regardless of age, to avoid needless tearing of the backs of the females.

All breeding hens and toms that are not to be used for another breeding season should be marketed about June 1. If older hens are used in breeding, it is advisable to replace 3-year-old females with young birds, since egg production decreases rapidly after that age. Immature stock should never be used but, as mentioned before, well-matured young toms and pullets make good breeders especially if trap nesting and pedigreeing can be carried on, thus enabling the

breeder to cull properly and sell as market birds the offspring of all hens that die during their first laying season.

It is not advisable for the average producer to inbreed turkeys, as this practice has been found to lower the vitality of the stock. When only one breeding pen or flock is kept, it is advisable to obtain new blood every season from a reliable outside source.

EGG PRODUCTION

The time of year at which turkeys naturally lay depends largely on the climate of the region in which they are raised, being earliest in the South. However, climate need not be permitted to hold back egg production as artificial light can be used to obtain early eggs, as with chickens. Soon after mating begins, the female looks for a nesting place, and about 10 days after the first mating she begins to lay. One nest should be provided for every 3 or 4 hens. The number of eggs produced per bird depends on the breeding of the stock as well as on management. Under ordinary circumstances in the Northern States, young turkey hens should average 35 to 40 eggs and yearling hens 25 to 30 eggs each during the normal breeding season if they are broken up whenever broodiness occurs. By normal breeding season is meant the time between the date the first egg is laid (late in the winter or early in the spring) and June 1. If artificial lights are used, starting about February 5, the breeders should average 50 to 55 eggs each, or an increase of about 15 eggs by June 1, due to the lighting. A few turkey raisers have used lights in December or January, thereby securing very early hatched turkeys and further increasing turkey-egg production.

Turkeys are not extensively trap-nested, but the practice is carried on by producers who wish to pedigree the poults and carry on selective breeding. One trap nest is needed for each two hens. The hens should have free access to the trap nests before they start to lay, and they should be carefully watched to see that they do not lay their eggs anywhere except in the trap nests. Secluded places in the house or yard should be eliminated. A simple form of trap nest is illustrated in figure 9. The turkey enters at the front, through the trap door, which closes automatically when the turkey is inside. The door at the top of the coop is opened to release the bird from the nest.

When incubators or chicken hens are used to hatch the eggs, the turkey hens may be broken of their broodiness so that they will continue laying. Breaking the hens of broodiness by confining them to a wire-floored coop is very desirable because it permits the hatching of a relatively large number of early turkeys and a larger number from each hen. The birds hatched no later than June are the ones that grow and mature most satisfactorily and therefore attain the best size for the Thanksgiving and Christmas markets. Early hatched birds should be marketed at Thanksgiving or before, and those of later hatches can be used to supply the Christmas and New Year demand. There is some demand for freshly dressed turkeys at all times of the year. To meet this demand turkeys may be hatched from eggs laid during summer and fall. By the use of artificial light and proper feeds, hatchable eggs can be produced in the winter and early in the spring.

It is natural for turkey hens to seek secluded places to lay their eggs. Yards that have comparatively short vegetation and are free from bushes or other places of concealment are best, because such conditions discourage the birds from laying outside the nests provided for them. A lookout for hidden nests must be maintained, otherwise eggs may not be collected regularly and may be frozen, partly incubated, or destroyed by animals. Sometimes the hidden nests can be found by watching the turkey hens carefully as they make their way to them, but an easier and quicker method is to confine the hens early some morning soon after they come from the roosts and then let them out about 2 p. m.; the laying hens will make straight for their nests in order to lay the eggs they have been hold-

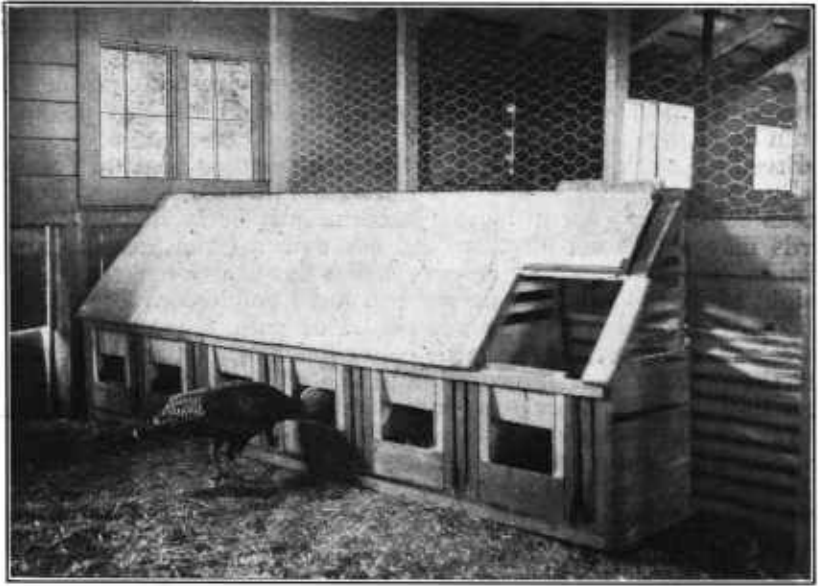


FIGURE 9.—Turkey trap nests. The dimensions of this nest are as follows: Width, 14 inches; depth, 24 inches; height in front, 19 inches; and height in back, 45 inches. The trap-nest fronts may be home-made, or commercial fronts may be used.

ing. Nests are easily made of boxes or barrels placed inside the shelter or outside in the yards. Some turkey growers prefer to build nesting batteries with nests about 12 by 24 inches.

CARE OF HATCHING EGGS

Hatchability can be seriously damaged by holding eggs at temperatures above 65° or below 35° F. It is most important to hold eggs in a room that can be kept below 65°, preferably between 50° and 60°. Eggs should be collected several times daily and held on their sides or on the small end. It is best to turn eggs gently once daily while they are being held for hatching, but this is probably not necessary unless they are to be kept longer than a week. For best results they should not be held longer than 10 days but if they are held at a suitable temperature and are turned once a day, fair hatchability will be retained for as long as 3 weeks.

FEEDING

Feeding young breeding turkeys is a matter of supplying a growing ration in the fall and early in the winter, a laying ration late in the winter and in the spring, and a maintenance ration during the summer. Unless breeders are to be kept over for another year, they should be marketed, if possible, about June 1 in order to reduce feed costs and to aid in preventing the spread of blackhead and other diseases that may affect adult turkeys during the summer. If breeders are to be held over for the next season or until fall and if a good summer and fall range is available well away from the growing stock, the breeders are best carried through the summer on a daily feeding of whole grain such as a mixture of equal parts of corn, oats, and wheat. This mixture should be fed at the rate of one-fifth pound per hen daily as a supplement to feed obtained from the range. The toms, if ranged with the hens, should have access to grain in a feeder too high for the hens to reach. A better method is to pen the toms in a separate range lot and give them each one-half pound of grain daily in troughs.

Breeding stock so managed during the summer respond economically to a fattening diet offered in the fall. Beginning about 4 weeks before they are to be marketed, usually early in October, the birds may be offered all they will eat daily of the grain mixture. Within 4 weeks they will acquire a fine finish and make a gain in weight of $2\frac{1}{2}$ pounds or more per hen and 4 pounds or more per tom. About $5\frac{3}{4}$ pounds of grain per pound of gain is required for the 4-week fattening period. A little better finish is acquired in 6 weeks; but the grade is not improved, and the gains are more expensive. Breeding stock that are to be kept over should be held in the range lots as long as possible and should also be fed liberally in the fall, in order to put them in good condition for the winter.

Later in the fall and through the winter the rations for breeders, especially young breeders, may be the same as the growing rations normally fed to young stock. Scratch grain and a simple mash, such as that suggested for growing poults, make a good feed for carrying the breeders through the winter, since they meet the demands of the birds for continued growth or for maintenance. If the climate is such that green feed and sunshine are not available, as in the Northern States, add 5 percent of alfalfa-leaf meal and 1 percent of cod-liver oil to the mash. The birds should have all the mash and scratch they will eat during the fall and winter. Breeders will not become too fat if fed in accordance with this method. They will be fat, but this is desirable if heavy egg production is expected.

For the production of large numbers of hatchable eggs turkeys require a ration containing the various nutrients and vitamins. Good results can be obtained with a simple laying ration, such as laying mixture No. 1, if the birds get an abundance of fresh green feed and have range. When ground oats or ground barley is included in any mixture it should be finely ground. Alfalfa leaf meal should be bright green in color. The cod-liver oil should be a standard good-quality product, or the equivalent in fortified cod-liver oil may be used if thoroughly mixed.

Laying Mixture No. 1

MASH	Parts by weight	SCRATCH
Yellow corn or barley (ground)---	20	Mixture of equal parts of yellow corn, wheat, and heavy oats. (Grain sorghum may be used in place of the corn.)
Wheat middlings or ground wheat---	15	
Oats or barley (ground)-----	20	
Meat scrap (50- to 55-percent protein)-----	10	
Fish meal (60- to 70-percent protein)-----	10	
Wheat bran-----	12	
Ground oystershell or limestone--	7	
Dried milk-----	5	
Salt (fine, sifted)-----	1	
Total-----	100	

Laying mash should be kept before the birds at all times beginning about a month before eggs are expected. Scratch mixture should be fed in troughs, at the rate of one-fifth of a pound per day per bird, so that the consumption during laying will be about equal parts of the mash and scratch. The birds must have access to growing green feed, direct sunshine, and water.

If the birds cannot obtain fresh succulent green feed and direct sunshine in abundance, as in the case of those kept in confinement or in cold climates, the ration must be more inclusive. Such a ration may be compounded as follows:

Laying Mixture No. 2

MASH	Parts by weight	SCRATCH	Parts by weight
Yellow corn or barley (ground)---	26	Yellow corn or grain sorghum---	40
Wheat middlings or ground wheat---	20	Heavy oats-----	37½
Wheat bran-----	12	Wheat-----	20
Alfalfa leaf meal-----	10	Cod-liver oil-----	2½
Meat scrap (50- to 55-percent protein)-----	8	Total-----	100
Dried milk-----	8		
Fish meal (60- to 70-percent protein)-----	8		
Ground oystershell or limestone--	7		
Salt (fine, sifted)-----	1		
Total-----	100		

As with the simpler ration, the mash should be kept before the birds at all times, and the scratch can be hand-fed in troughs at the rate of one-fifth of a pound per bird per day. Clean water should be provided at all times. The same ingredients can be mixed and fed as an all-mash ration with good results. The all-mash formula is as follows:

Laying Mixture No. 3 (All mash feed)

	Parts by weight		Parts by weight
Yellow corn (coarsely ground)---	30	Dried milk-----	5
Oats (finely ground)-----	20	Fish meal (60- to 70-percent protein)-----	3
Wheat middlings (standard or brown)-----	21	Ground oystershell or limestone--	4
Wheat bran-----	6	Cod-liver oil-----	1¼
Alfalfa leaf meal-----	5	Salt (fine, sifted)-----	¾
Meat scrap (50- to 55-percent protein)-----	4	Total-----	100

This all-mash mixture is kept before the breeders at all times. Just enough to carry the birds through each day should be given. In this way its freshness is assured, an important consideration in all-mash feeding.

If desired, the oyster shell or limestone may be fed separately in hoppers, but mixing it in the mash saves labor and prevents excessive consumption. Gravel or granite grit should be provided to furnish grinding material. Clean water, placed in contamination-proof vessels, should be provided at all times. Alfalfa hay probably cannot be depended upon to supply adequate amounts of green-feed substitute for hatching-egg production. Only by fresh green feed or green-feed substitutes and fish oils can those requirements be met. The oil should be freshly mixed in the feed every week or two.

All feed should be fed in feeders, never on the ground or in the litter. Feeders should be constructed so as to prevent waste and contamination with droppings. Turkey hens consume a little less than one-half pound of mash and scratch grain per day when practically all of their feed is furnished. Toms consume about 0.7 pound daily, eating mostly scratch grains.

COMBATING DISEASES AND PESTS

Turkey raisers, to be permanently successful, must follow some system of sanitation. Many growers have prevented disease and the attacks of parasites in their flocks by providing range on clean soil; that is, soil on which no poultry manure has been spread; feeding their birds from feeders that cannot be contaminated by droppings; and keeping the quarters sanitary at all times. *Separation of the turkeys from chickens and other poultry at all times is essential.*

Diseases and parasites of turkeys are discussed in detail in Farmers' Bulletin 1652, Diseases and Parasites of Poultry. Coccidiosis often causes heavy losses in young turkeys. It is best combated by carefully cleaning the brooder house and changing the litter once a week during the brooding period, keeping the litter dry, and using wire-covered feeding platforms. Turkeys are subject also to the attacks of various species of worms, but treatment for worms should not be undertaken until the presence of worms has been determined by examining the droppings or by post-mortem examination.

BLACKHEAD

Although other infectious diseases sometimes affect turkeys, blackhead is by far the most destructive ailment. It is caused by one of the Protozoa and is primarily a disease of the caeca (the blind pouches of the intestines) and the liver, but the fact that the head of the affected bird often becomes discolored has given the disease its common name, blackhead. It attacks turkeys most frequently, but chicks are often affected by it without showing symptoms; thus the chickens carry and spread the infection to turkeys when allowed to range with them. A combination of spotted liver and ulcerated caeca indicates that the birds have blackhead infection.

Although blackhead affects adult turkeys, it occurs principally among poults between the ages of 6 weeks and 6 months. It is found to a greater or lesser extent throughout the United States. The tur-

keys affected by blackhead, like all birds having infectious diseases, should be removed immediately from the flock to prevent the spread of the disease. The best procedure is to kill the sick birds and burn or bury the bodies, as no treatment has been found satisfactory. Move the flock to clean ground, if possible; but if this cannot be done, clean out and disinfect the roosting place, plow the ground in the yards, and install a system of yard sanitation. Keep chickens and all other poultry away from turkey yards at all times in order to prevent infection from this source. The organisms which cause the disease may be carried by flies, blown with dust, conveyed in contaminated soil on the feet of the caretaker, or spread for considerable distances in other ways.

Several measures for preventing blackhead are practiced, the chief of which are: (1) Obtaining eggs or stock from flocks known to be healthy; (2) quarantining and worming all new stock; (3) cleaning and changing the litter at least weekly during the brooding period; (4) keeping both young and mature turkeys on clean ground at a considerable distance from chickens; (5) excluding, so far as possible, pigeons, sparrows, and persons from the turkey houses and yards; (6) frequently cleaning and occasionally disinfecting growing houses, feed troughs, and all other equipment; (7) feeding only in clean feeders, never on the ground; (8) immediately killing and deeply burying or completely burning all diseased birds; and (9) eliminating all stagnant water pools where the turkeys range. Clean range, clean quarters, clean feed, and clean water are most important.

LICE AND MITES

Lice may cause high mortality among young poults, those badly infested gradually becoming weaker until they die. Head lice are the most troublesome and are found close to the skin near the top of the head, above and in front of the eyes, and under the throat. Applying an insect powder, preferably sodium fluoride, when the hen is set, is an easy method of preventing lice from getting a start among poults. Apply the sodium fluoride among the feathers, working it well down next to the skin, 1 pinch on the head, 1 on the neck, 2 on the back, 1 on the breast, 1 below the vent, 1 at the base of the tail, 1 on each thigh, and 1 scattered on the underside of each wing when spread. If this treatment is not applied, hen-hatched poults are almost certain to have lice.

If the hen has been treated in this manner before being set and the poults are not exposed to infested stock or premises, they will remain free from lice indefinitely. It is well, however, to examine the poults occasionally and, if lice are found, to apply sodium fluoride sparingly. It should not be applied until the poults are at least a week old, and then only two very small pinches should be used. Distribute one of these on the neck, the top of the head, and the throat, and the other on the back and below the vent. After the poults are old enough to roost, control lice by applying nicotine sulphate solution in a thin line on the top surface of the roosts. Repeat as often as necessary to keep down the lice and be sure that each bird is exposed to the treatment. Sodium fluoride applied as

directed for delousing setting hens or as a dip will completely eliminate all species of lice from mature stock.

The dipping method consists in immersing mature fowls in a large tub of solution made by mixing 1 ounce of sodium fluoride to each gallon of tepid water. Immerse the birds for only a few seconds, raising the feathers at the same time to allow the dip to penetrate to the skin. Dip the birds on a warm day, preferably in the morning, so as to give them time to dry before night.

Destroy red mites in the roosting quarters by painting the under side of the roosts and the roost supports with anthracene oil, crude oil, crank-case oil, or any coal-tar disinfectant. Make the application light but thorough, and do it preferably in the morning.

The fowl tick or blue bug is one of the worst pests of turkeys in the Southwest. It can be controlled by the methods advised for controlling red mites.

PROTECTION FROM COLD, DAMPNES, AND ENEMIES

Protection from adverse weather conditions and enemies is required if turkeys are to be raised successfully. An open-front shed with a reasonably tight roof and dry floor, so arranged that the north, west, and east sides can be closed against storms, will give ample protection for full-grown turkeys. Roosts may be made from good-sized poles or 2 by 4's nailed flat to supports which should be slightly higher at the rear than at the front, where they should be about 2½ feet above the floor. The space between the roosts should be about 2 feet and the space underneath enclosed with poultry wire. In the southern part of the United States there is little need for well-built turkey houses, but during damp, cold, or stormy weather the turkeys should have protection of some kind. They should not be exposed to dampness, but they can stand a considerable amount of dry cold.

In many localities protection from dogs must be provided in some way. High roosts or well-built shelters provide this at night. Keeping the birds confined to high roosts or in dogproof shelters at night and during the early morning hours gives a good protection. An attendant or a good watchdog is needed to protect the turkeys when they are off their roosts or out of their shelters.

INCUBATING TURKEY EGGS

The vigor of the breeding stock, the manner in which it has been fed and managed, and the care given the eggs will determine to a high degree the hatchability of the eggs. An important measure of success in turkey raising is the number of fully matured turkeys raised in proportion to the number of hens in the breeding flock. An average of 25 mature birds raised per hen is considered very good in well-managed turkey flocks, whereas in most general-farm flocks 10 to 15 mature birds per hen would be a good average.

The period of incubation of turkey eggs is 28 days, and the method is much the same as that used with chicken eggs. Turkey eggs can be successfully hatched by turkey hens or chicken hens, or in incu-

bators. Hatching in incubators is best and is coming into more general use, especially on farms and ranches where turkeys are raised in large numbers. Turkeys hatched and reared by hens, especially chicken hens, are likely to contract disease and become infested with parasites at an early age. Sitting turkey hens can cover from 15 to 18 eggs; chicken hens, from 7 to 10 eggs.

NATURAL INCUBATION

Hatching the eggs under turkey hens is widely practiced and is often the most practical method. When the turkey hen becomes broody and has remained consistently on the nest for 2 or 3 days, she should be given her eggs. If several turkey hens are sitting at the same time, care should be taken that each gets back into her own nest. Nests are most conveniently arranged on the ground, in boxes about 2 feet square or in barrels. If rats are a menace, the nest should furnish protection against them and should always be made proof against larger animals so that the turkey hens will not be disturbed or the eggs destroyed. The nests should be flat and shallow, as deep nests may result in crushed eggs or crushed baby poults. Nests with damp sod bottoms and only a little straw to keep the eggs from rolling into the corners are generally satisfactory. Nesting batteries in which each hen is provided with a small individual run so that she can get off and on the nest at will are very good. With this method the only care necessary is to see that feed and water are always before the hens and that each one remains broody. If individual runs are not provided, the hens should be taken off daily, allowed to exercise and eat, and then returned to their own nests. Plenty of water to drink and clean, wholesome grain feed, such as a mixture of wheat, oats, and corn, should be provided, and fresh green feed or good alfalfa hay should be made available.

Turkey or chicken hens, before being set on turkey eggs, should be treated with sodium fluoride, as previously directed.

ARTIFICIAL INCUBATION

Correct incubator temperatures are much the same for turkey eggs as for chicken eggs, but the greater size of the turkey eggs may necessitate some adjustment of the apparatus used in measuring the temperature. This is true in nearly all kinds of incubators except those of the forced-draft type. The relative position of the thermometer in the egg chamber is important in the accuracy with which it records the temperature. For hatching turkey eggs the proper position of the thermometer is usually indicated in the directions that are furnished by the manufacturer of the incubator. As a general rule, with the bottom of the bulb $1\frac{1}{2}$ inches above the egg tray, the thermometer should read 100.5° F. for the first week, 101.5° the second, 102.5° the third, and 103° the last week. Forced-draft incubators are usually run at about 99.5° . Temperature can best be regulated, however, by using the thermometer that goes with the machine, placing it in the position recommended by the manufacturer, and then following the manufacturer's instructions for hatching turkey eggs, making sure that the egg trays do not sag.

Turkey eggs lose about 3.5 percent less moisture during incubation than do chicken eggs, notwithstanding the fact that turkey eggs require about 7 days longer to hatch. Excellent hatches have been obtained when the loss of moisture based on the weight of the eggs just before they were set, ranged within the following limits: After 6 days of incubation, 2 to 3 percent; after 12 days of incubation, 4.1 to 6 percent; after 18 days of incubation, 6.2 to 9 percent; and after 24 days of incubation, 9 to 12 percent.

On this basis, a dozen turkey eggs of normal size should lose about 1 ounce for every 6 days of incubation. The air cells of turkey eggs are smaller in proportion to the size of the eggs than are those of chicken eggs because normal evaporation in turkey eggs during incubation is considerably less than that in chicken eggs. When more moisture is needed in the incubator it can be provided by putting in water pans, or by placing burlap wicks in the pans. When less moisture is needed the water pans may be removed or the ventilation increased.

As a rule the eggs should be turned at least 3 and preferably 4 to 6 times daily. Four times daily, every 6 hours, day and night, is an excellent plan. They should be tested preferably on the eighth or ninth and again on the twentieth to twenty-second days, and all infertile eggs and those having dead germs should be removed. Cooling the eggs once or twice a day until they feel slightly cool to the face may be of value in small incubators. Turning and cooling should be discontinued about the twenty-third day, and the incubator door should be darkened and kept closed until hatching is completed. The poults may then be left in the incubators for about 24 hours or else put in the brooder and fed as soon as hatching is completed and the poults thoroughly dried off. Poults held in the incubator should be kept at about 95° F. and should have a rough surface such as ¼-inch-mesh hardware cloth to stand on. Keeping the incubator dark helps to keep the poults quiet and tends to prevent spraddle legs. There is no good reason for withholding feed longer than 24 hours. If feed is withheld for a much longer period when the poults are in the brooder, they may eat the litter. Therefore, poults should be fed when they are put in the brooder house.

Shipping day-old poults in specially built strawboard boxes has been found to be satisfactory. The container is larger than that ordinarily used for baby chicks, 60 poults commonly being placed in each box.

RAISING POULTS

There are few turkey-raising problems so important as brooding and rearing the poults, because the greatest losses in turkey raising usually occur in the first few weeks of the birds' lives. Heavy mortality among the poults may indicate that the breeding stock used was low in vitality or was poorly managed, but it more often indicates poor feeding or management of the poults. The importance of keeping both the poults and the breeding turkeys on ground free from infection and away from chickens cannot be overemphasized. Improper brooding methods cause great losses, because turkey poults are very susceptible to cold, dampness, overcrowding, overheating, unsuitable feeds, and unsuitable litter, and they succumb readily to attacks of diseases and parasites.

BROODING

The poults may be brooded naturally by turkey hens or artificially by brooders. Brooding by turkey hens provides a never-failing source of heat, allows the poults to be raised in small flocks, and permits taking advantage of free-range conditions. Its disadvantages are that the young turkeys may contract disease or become infected with parasites from the hens and they may wander too far and be killed by storms or predatory animals. Artificial brooding makes it easier to maintain proper sanitation, keeps down costs, puts the poults more directly under the control of the operator, and is more adaptable to large-scale production.

NATURAL BROODING

Brooding poults by turkey hens is not difficult, although several details should receive careful attention. As soon as the hatch is completed and the poults begin to run out from under the sitting hen, transfer the hen and her brood to a coop. A coop of simple design, such as the A-shaped type (fig. 10), large enough to accommodate a turkey hen comfortably, and well built to protect the brood from rains and natural enemies, is all that is required. It should be about 5 feet long, 3 feet wide, and 3 feet high, with a raised, rat-proof floor. Provide good-sized screened openings for ventilation in hot weather. These openings should be so fixed that rain will not beat into the coop.

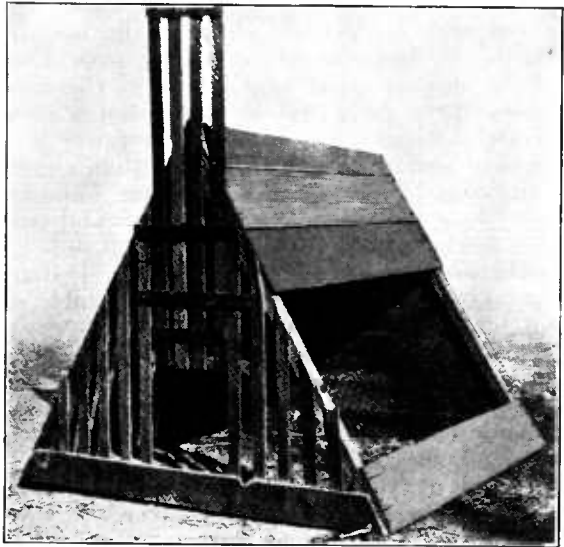


FIGURE 10.—A well-built brood coop which can be used either for setting a turkey hen or for raising a brood of poults.

Have a separate coop for each hen, and if there are several broods, place the coops some distance apart on well-drained soil where the grass is fairly short.

For the first day or so it is well to confine the poults in the coop with the mother hen. Then make a small yard, using boards or wire around the front of the coop, and allow the poults to run in and out at will. However, they should not be allowed to run in long, wet grass, and during heavy rains they should be confined to the coop. Move the coop and yard to fresh ground every few days, clean it once a week or more frequently, and disinfect it occasionally. When the poults are about a week old the mother hen may be allowed to roam with her brood, but care should be taken to see that the

entire brood returns in the evening and is protected at night from predatory animals. Good results may be obtained by keeping the mother hens confined and allowing the poults to range, but the brood should be properly sheltered during rainstorms or damp weather, which are likely to cause high mortality. The poults may be kept with the mother hen for 3 months or more, but better results are usually obtained by moving them to a separate rearing field on clean ground when they are from 8 to 10 weeks old. If they have shelter and will roost, they are better off without the hens after that age. A turkey hen will raise up to 20 poults successfully, but more than 20 can sometimes be placed with a hen in warm weather.

ARTIFICIAL BROODING

The practice of brooding poults artificially is becoming more popular and is usually more successful than brooding with turkey hens. The methods used in artificial brooding are very similar to those used in raising chicks, which are discussed in Farmers' Bulletin 1538, *Incubation and Brooding of Chickens*. However, one point of great importance in brooding poults artificially is to make sure that they do not crowd together while in the brooder house. This can be avoided by frequent attention, by providing an even temperature, and by having good ventilation in the brooder house. A colony house or permanent brooder house that is suitable for brooding chicks is equally suitable for turkeys, but fewer birds should be put in the house, as turkey poults are larger than chicks. Between 75 and 125 poults should be placed under one 52-inch hover in the average colony brooder house. Larger hovers and larger brooding rooms will accommodate 225 poults or more, but only an experienced operator should attempt to raise groups larger than 150. The prevailing custom is to use brooder stoves in portable colony houses or permanent brooding quarters.

The colony houses may be moved several times each season, thereby giving the poults plenty of free range on clean soil. Since blackhead is closely associated with insanitary conditions, special effort must be made to keep the houses, runs, and yards clean. If permanent brooder houses are used, a floor of concrete from 12 to 14 feet wide or a small gravel or cinder-floored yard is often used in front of the house. A skeleton framework covered with $\frac{1}{2}$ - to 1-inch-mesh wire may also be used to floor the outside run either with the permanent brooder houses or with the colony houses (fig. 11). Poults are regularly confined to this small yard for the first 8 weeks and in some cases have been successfully reared to market age in it. However, a clean yard containing growing green feed is an advantage in brooding. If it is used only for about 8 weeks each year, there seems little danger of contamination.

The brooder and brooder house should be operated to keep the young turkeys comfortable. A dim light under or above the hover at night has a quieting effect on the poults. The temperature should be high enough to keep the poults comfortable but not high enough to be detrimental to their health. When the poults are first put into the colony house with the brooder stove, the temperature 3 inches

above the floor under the hover should be from 95° to 110° F. This temperature should be lowered gradually as the poults get larger until they are 6 or 8 weeks old, when they require little or no heat, especially in the daytime. It is a common practice in cold weather to keep the general room temperature at the floor rather high, about 75° , to prevent crowding. The exact temperature, however, is of minor importance provided the poults are kept comfortable and good ventilation is maintained. The poults, if comfortable, will be active and contented. This is the real test of temperature. All warm points and surfaces except those at the brooder itself should be eliminated. Free access from all parts of the brooder room to the hover must be provided. All corners in the brooding room, especially

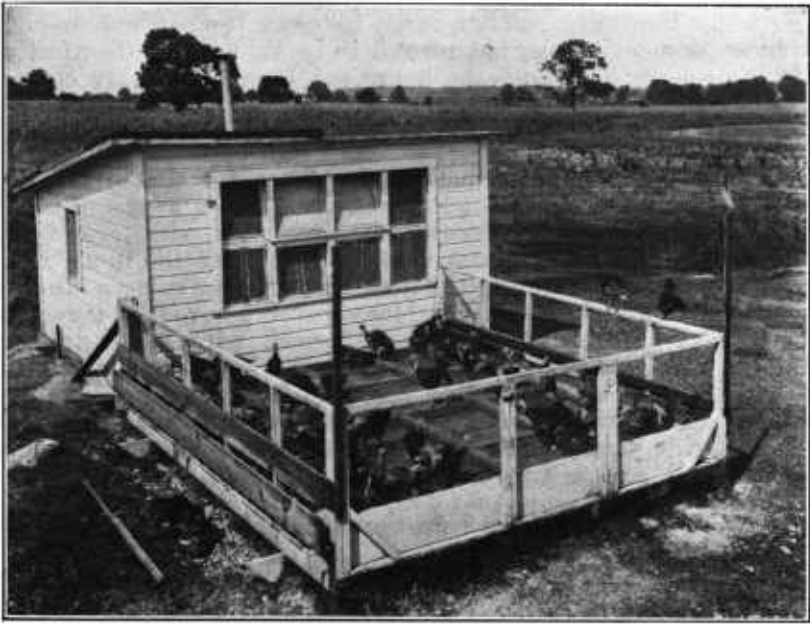


FIGURE 11.—Young turkeys in a colony house equipped with wire-floored sun porch.

back of the hover, should be rounded, preferably by using $\frac{1}{2}$ -inch-mesh poultry wire. A fence of the same material should be set up around the hover for the first 2 or 3 days until the poults become accustomed to their surroundings and learn to return to the source of heat. Flat roosts 2 to $2\frac{1}{2}$ inches wide and slightly tilted up at the rear may be placed at graduated levels in the brooder house when the poults are from 2 to 3 weeks old, to encourage them to begin roosting at an early age. This provision lessens the danger of night crowding. The front roost should be 6 inches above the floor and each of the others a few inches higher than the one in front of it and about $8\frac{1}{2}$ inches apart, center to center.

SANITATION

The brooder house should be thoroughly cleaned and the litter changed once every 7 days, or oftener if disease occurs, regardless of the type of litter used. This cleaning schedule must be adhered

to rigidly if blackhead, coccidiosis, and other diseases are to be prevented.

Thoroughly clean and disinfect brooder houses and equipment used for turkeys at the end of each brooding season or oftener if disease occurs. First clean the house thoroughly and burn all litter and droppings or haul them to land that is not to be used for poultry and from which there will be no drainage into the turkey range. Then scrub the floor and sides of the house, if it is of board construction, with boiling hot lye solution (one-third of a can to a pail of water) and allow them to dry out. Next, thoroughly spray the entire inside of the building with a 3- or 4-percent solution of cresol compound or any other approved disinfectant. Give the same treatment once a year to the quarters occupied by the breeding stock. The "fire gun", a large kerosene torch which involves the blow-torch principle, has proved to be valuable in disinfecting, if it is properly used and the house has been thoroughly cleaned.

LITTER

Sand or gravel is recommended for litter for the first 2 or 3 weeks; after that, clean wheat straw is advised as a means of saving labor. Gravel or sand makes the best litter; but with large flocks, using it for more than 2 or 3 weeks may require too much labor. Straw or hay, if used during the first 2 weeks, may cause a stunting of growth and a high mortality. Many growers have been successful in using, as a substitute for litter, $\frac{1}{2}$ -inch wire mesh stretched tightly a few inches above the floor of the house, but it requires much labor to clean this, and it seems to have no advantage over clean litter. A wire-floored sun porch makes a good substitute for an outside yard during the brooding period although, as previously stated, a clean yard in grass is preferable.

EARLY DEVELOPMENT

The poults, when first hatched, are covered with soft down. When they are about 10 days old, feathers begin to appear where the wings join the body, and in about 3 weeks the tail feathers begin to appear. From then on feather growth is rapid, and when the poults are 2 months old they are well feathered. About the fifth week fleshy protuberances called caruncles begin to appear, and by the seventh week they begin to extend down the neck. The appearance of caruncles in the poults is termed "shooting the red." On the top of the head of both males and females a fleshy protuberance develops into what is called the "dew bill" or "snood"; on males it is larger and more elastic than on females.

The sex of young turkeys can be distinguished by the appearance of a tuft of hairs on the breast of males between 3 and 4 months old. The tuft usually does not appear on the breasts of the females until they are much older, and the hairs of the tuft are shorter and finer than those on males. The hock joints on the males are much broader and heavier than on the females. The sex of well-grown Bronze turkey poults can be distinguished by examining the mature breast feathers which appear at 12 to 14 weeks. Those of the males are bronze black with no white, whereas the tip of those of the females

have a narrow white edge. Day-old poults may be sexed as is done with baby chicks by examining that part of the sex organs that can be seen at the vent.

MARKING

When large numbers of turkeys are raised it is advisable to adopt some system of marking the poults that enables the grower to keep a record of the age and breeding of the different broods, as this is of assistance in selecting early hatched birds for breeding and slaughter purposes. Such a system also makes it possible to separate the poults out of special matings from the rest of the flock or from neighboring flocks. The poults may be marked by punching holes in the webs between the toes or slitting these webs. Different webs may be punched or slit for different broods, and thus provide a record of all turkeys raised.

Heavy, aluminum, clinch pigeon-wing bands are well adapted for marking young turkeys. The bands can be applied in two ways: According to the first, the band is first made round and clinched, then slipped over the baby poult's toes and flattened so that it will not come off but at the same time will allow for some growth of the leg. When the poult is about 4 weeks old the band is transferred to the wing by unclenching and inserting it in a hole made in the middle of the web between the first and second joints of the wing and about one-fourth inch from the edge. The band is again clinched and made round so that it is not easily flattened and its lettering can be read easily. According to the second method of application the band is put directly into the wing at hatching time, a thin knife blade being used to make the hole for the band, near the edge of the web and midway between the joints of the wing. Turkey poults, when good sized, may be tattooed on the wing for identification. When the breeding turkeys are selected as they approach maturity, heavy wing bands or heavy permanent leg bands may be used if the birds were not marked at an earlier age.

FEEDING GROWING TURKEYS

Success in turkey raising depends mainly upon the combination of feeds given the young poults. Poor-quality feeds, lack of vitamins, and shortage of proteins, especially if the poults are closely confined, are the more common causes of failures. Some difficulty may be experienced in getting artificially brooded poults to eat, as a young poult is much less active than a chick; but if several small troughs are provided there should be no serious trouble from this cause. Dipping the beaks of backward poults in milk or water, or feeding oatmeal flakes may induce them to eat. Poults brooded with hens, of course, do not need this special attention.

After the poults are from 6 to 8 weeks old they may get some of their living from a good range, but the use of additional feed, preferably a balanced ration of mash and scratch grain, will give better growth and result in early maturity and greater returns above feed cost.

In natural brooding the turkey hen, while confined to the coop, should be fed mash and given some tender green feed. Water and gravel or grit should, of course, be kept before her all the time.

In feeding the hen and her brood it is advisable to feed the poults outside the coop and the hen inside in order to prevent the hen from wasting the feed intended for the poults.

For the first 24 to 72 hours after hatching, poults can live without feed, the yolk of the egg which they absorb before hatching being sufficient to maintain them for that length of time. As soon as they are put into the brooder house or with the hen they should be fed. If they are not fed for the first day or two they should be kept in

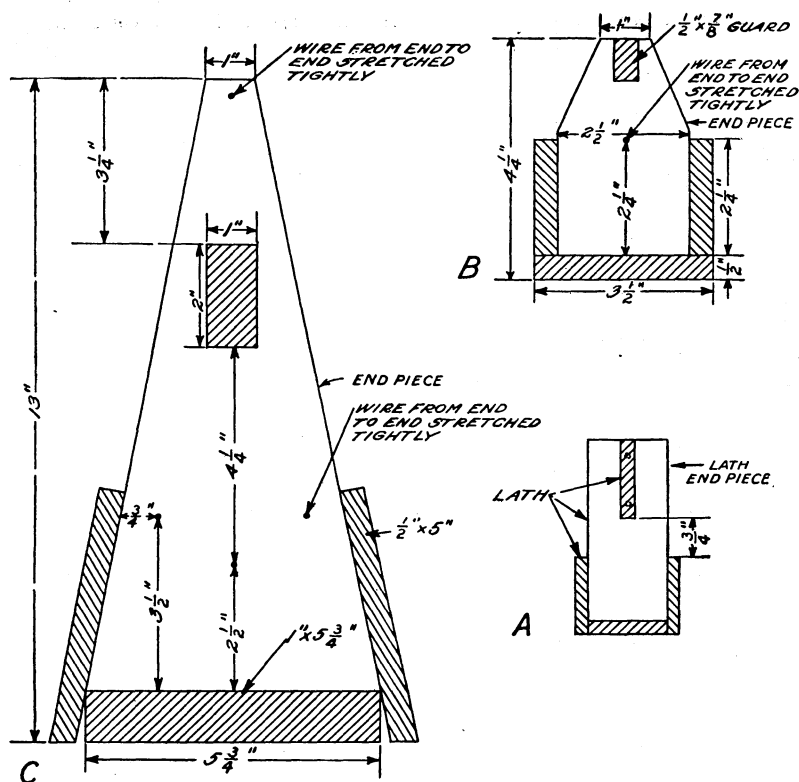


FIGURE 12.—Cross section of trough feeders for turkey poults of various ages; A, Lath feeder for first week; B, feeder for second to fourth weeks; C, feeder for fifth to twelfth weeks. Feeder C will give better results if equipped with a reel, at the top, similar to that shown in figure 14.

a darkened coop or incubator. However, leaving the poults in a darkened incubator for only 12 to 24 hours and feeding them as soon as they are removed to the brooder seems to be better and is now becoming a general practice.

The first feed may be a mixture of finely chopped, tender green feed, and dry starting mash. Hard-boiled eggs, ground or crumbled, may also be added if desired. This feed should be placed on clean boards or in little feeders made of laths as illustrated in figure 12. It is a good plan to keep the feed before the poults at all times from the very beginning so that the backward poults will learn to eat and their growth rate will not be retarded. Milk, if not too high priced, may be kept before them in easily cleaned crockery, tin, wooden, or graniteware receptacles which the poults cannot get into

or contaminate. After the first few days the green feed, unless it is available in the yards, may be spread on top of the mash in the feeders. Turkey poults appear to be easily harmed by eating large quantities of tough, fibrous litter or green feed; hence the selection of a tender green feed is most important.

FEEDING DURING THE FIRST 6 TO 8 WEEKS

The use of a well-balanced, all-mash ration is the simplest and most practical method of feeding poults during the first few weeks of their lives. Many commercial starting mashes are available or good home-mixed mashes may be used with excellent success. The protein, mineral, and vitamin contents are the main points to be considered. Milk in some form is very desirable, dried milk being preferable. Liquid milk is a fair feed, but the dried form is preferable at least for starting rations.

The following starting mashes are recommended for feeding turkey poults during the first 6 to 8 weeks. Mash No. 1, fed without liquid milk, is preferable.

STARTING MASH NO. 1	Parts by weight	STARTING MASH NO. 2	Parts by weight
Yellow corn (ground)-----	17	Yellow corn (ground)-----	33
Whole oats (pulverized)-----	15	Wheat middlings or shorts-----	20
Meat scrap (50- to 55-percent protein)-----	12	Wheat bran-----	10
Wheat bran-----	12	Whole oats (pulverized)-----	10
Wheat middlings or shorts-----	12	Meat scrap (50- to 55-percent protein)-----	10
Dried milk-----	10	Alfalfa leaf meal-----	10
Alfalfa leaf meal-----	10	Fish meal (60-percent protein)-----	5
Fish meal (60-percent protein)-----	10	Cod-liver oil-----	1½
Cod-liver oil-----	1½	Salt (fine, sifted)-----	½
Salt (fine, sifted)-----	½		
Total (crude protein 25 percent; crude fiber 6 percent)-----	100	Total (crude protein 19 percent; crude fiber 6 percent)-----	100

Starting mash No. 2 is advised for feeding when liquid skim milk or buttermilk is kept before the poults at all times. Some water is furnished, allowing one dish of water to several of milk. These starting mashes are fed without scratch grain; but water, green feed, and hard grit such as fine gravel, coarse sand, or commercial granite grit should be supplied. The green feed should be chopped fine and scattered on top of the mash in the feeders once or twice daily, allowing all the poults will consume in about half an hour. Tender alfalfa tops, onion tops, lettuce, and tender, short lawn clippings, preferably those containing clover, are all good feeds. Tough green feed should be avoided as it may cause impaction. Green feed as picked by the birds from the yards is most desirable. In that case hand feeding is not necessary. The mash in dry form should be kept before the poults at all times, but only enough mash to last for a day or two should be supplied at one time. About 1 inch of feeder space per poult (including both sides of the feeders) is desirable. This should be increased to 2 or 3 inches after about 2 or 3 weeks. Plans for feeders are shown in figure 12.

FEEDING FROM 6 TO 8 WEEKS TO MARKETING TIME

Rations for growing the poults after the age of 6 to 8 weeks may include mash and whole grain or liquid milk and whole grain. Many

turkeys are grown and fattened on grain supplemented with whatever insects and green feed can be obtained from the range. A better plan is to provide sufficient protein and minerals to give normal growth. The minimum feeding advised is to allow each day one liberal feeding of a 20-percent protein mash, or to furnish all the milk the birds will drink with a feeding of whole grain. Either the mash or the liquid milk should be used with liberal feedings of whole grain for fattening in the fall.

Good growing mashers suitable for different conditions may be made as follows:

GROWING MASH NO. 1	Parts by weight
Yellow corn or barley (ground)---	25
Oats or grain sorghum (ground)---	25
Wheat middlings or shorts-----	20
Meat scrap (50- to 55-percent protein)-----	19
Wheat bran-----	10
Salt (fine, sifted)-----	1
Total (crude protein 19 to 21 percent)-----	100

GROWING MASH NO. 3	Parts by weight
Yellow corn (ground)-----	35
Meat scrap (50- to 55-percent protein)-----	15
Wheat bran-----	10
Wheat middlings or shorts-----	10
Oats or barley (ground)-----	10
Alfalfa leaf meal-----	10
Dried milk-----	9
Salt (fine, sifted)-----	1
Total (crude protein 20 to 21 percent)-----	100

GROWING MASH NO. 2	Parts by weight
Yellow corn or barley (ground)---	32
Soybean oil meal-----	26
Wheat middlings or shorts-----	15
Wheat bran-----	10
Oats or grain sorghum (ground)---	10
Steamed bonemeal-----	4
Ground oystershell or limestone---	2
Salt (fine, sifted)-----	1
Total (crude protein 19½ percent)-----	100

GROWING MASH NO. 4 (FOR CONFINEMENT REARING)	Parts by weight
Yellow corn (ground)-----	20
Wheat middlings (standard or brown)-----	15
Oats (finely ground)-----	15
Wheat bran-----	10
Alfalfa leaf meal-----	10
Yellow corn gluten meal-----	10
Dried milk-----	10
Meat scrap (50- to 55-percent protein)-----	5
Steamed bonemeal-----	2
Ground oystershell or limestone---	2
Salt (fine, sifted)-----	1
Total (crude protein 20 percent; crude fiber 6 percent)-----	100

These growing mashers are all fed with scratch grains consisting of such grains as corn, wheat, barley, and oats. Corn, wheat, or barley may be used as the only scratch grain except with growing mash No. 4, which should contain from 50 to 75 percent of oats. A good grain mixture may be made of 40 parts of corn, 40 parts of wheat, and 20 parts of oats. Mashers 1 and 2 are for flocks having access to a good green range. In mash No. 2 soybean oil meal, which has proved to be a good source of protein and is also good for fattening, is substituted for meat scrap. Mash No. 3 is a more complete ration and is advised for all conditions where the turkeys do not have an abundance of growing green feed.

Other combinations of grains and byproducts may be used successfully, the exact selection depending largely on availability and cost of feeds. It is best to use at least two grains, and preferably three or four, in the ration. Corn is the grain most commonly used in feeding turkeys. Not more than 60 percent of the entire growing ration

should consist of oats or barley or a combination of the two. Yellow corn tends to produce a deep-yellow skin color while white corn, barley, and wheat produce turkeys with light-colored skins.

If the birds have all the milk they will drink along with whole grains, they will consume enough milk to make good growth, if no water is fed. A mixture of 30 percent of corn, 30 percent of oats, 20 percent of wheat, and 20 percent of barley is satisfactory; so is a free choice of several grains. However, the whole-grain and liquid-milk method works well only when the birds are on a good, green range and is practical to use only when milk products are cheap. Some loss from pendulous crops is to be expected when liquid milk is consumed liberally and this is one of the chief objections to its use. The milk receptacles should be set on a wire screen and covered to protect them from the weather and from contamination with droppings. Sanitation is especially important when milk is used.

GENERAL SUGGESTIONS FOR FEEDING

Feed should be kept before the birds constantly from hatching to market age. During the first 6 weeks feed starting mash. During the seventh and eighth weeks feed a mixture of equal parts of the starting and growing mash. From 9 to 12 weeks feed the growing mash. From 13 weeks to marketing feed growing mash and scratch grain. No scratch grain is fed during the first 12 weeks. If a change is made from mash to the whole-grain and liquid-milk method, cut down the mash gradually until the poults learn to drink the milk and to eat the whole grain freely.

Cod-liver oil is necessary in starting rations, but as a rule it is not necessary in a growing ration unless the birds are confined. In that case, about 1 percent should be added to the mash. A good grade of plain cod-liver oil is advised for use in turkey feeds. Fish meal, though an excellent feed, may impart an undesirable flavor to turkey meat. Fish meal and cod-liver oil should be omitted from the fattening ration during the last 8 weeks before the birds are marketed. Birds should not be moved, or feeding arrangements radically changed in the last 6 weeks before marketing.

Feeding the growing mash wet is a common practice in some localities. Like the dry-mash and scratch-grain system, it produces fine-quality turkeys although the labor in feeding may be greater. With this method the turkeys are fed all they will eat of a moist, crumbly mash placed in troughs with sufficient trough space provided to accommodate all the flock at one time. Only as much mash as the birds will clean up in 30 to 60 minutes is fed twice daily. Tail picking seldom occurs during moist-mash feeding if the ration is complete.

Grit may be furnished in the form of commercial granite grit or coarse sand for little poults and fine gravel for the larger birds. Limestone grit does not serve well as grinding material and is unnecessary with the rations as listed.

The poults may be put on the rearing ground when they are from 8 to 12 weeks old. An alfalfa field is an ideal rearing ground and may be used as a permanent, fenced, rearing range divided into 2 or 3 sections. When the rearing range is divided into 2 sections, 1 may be used for 2 seasons in succession while the other is rested

for 2 seasons. A better plan is to divide it into 3 parts, allowing 1 season's use followed by 2 seasons' rest for each of the 3 sections. With portable houses and fences a method known as the "Minnesota plan" (p. 37) permits the turkey poults to be moved to a new section once a week and to an entirely new plot each year. Land on which no poultry of any kind have run for 2 years and on which no poultry manure has been spread, may be considered clean ground. The feed should not be put on the ground but in hoppers or troughs which should be moved frequently or set on wire-covered framework to prevent contamination with droppings. It is very important that the drinking water be fresh and clean and that the growing turkeys should not have access to stagnant water pools. Watering dishes should be placed on wire-covered platforms with a device to prevent contamination from the birds' perching on the top or sides.

The limited-range method with full feeding, as described, is recommended in preference to free range with limited feeding. However, conditions sometimes demand that free range be permitted, and limited feeding practiced. In such cases, when natural feed is abundant, good results can be obtained by feeding the poults, after they are from 8 to 10 weeks old, only once daily, as previously suggested. Any of the growing mashers previously listed should make a good supplement to range feeds. This extra feed will tend to keep the birds nearer home and keep them growing at a reasonably good rate. Scratch grains should also be fed and as marketing time approaches, will be eaten more liberally by the birds. For turkeys on free range, plenty of water in convenient locations should be provided. Water helps to maintain good health and may help to prevent the condition known as "crop bound."

Turkeys which are well fed should make increases in weight comparable to those given in table 2, which gives the average weights, at various ages, of Bronze turkeys raised in an experiment conducted at the United States Range Livestock Experiment Station at Miles City, Mont. These birds were fed starting and growing mashers containing about 22 percent of protein.

TABLE 2.—Average weights of Bronze turkey poults from hatching time to market age

Age	Average live weight		Age	Average live weight	
	Males	Females		Males	Females
	<i>Pounds</i>	<i>Pounds</i>		<i>Pounds</i>	<i>Pounds</i>
Newly hatched.....	0.13	0.13	16 weeks.....	10.35	7.67
2 weeks.....	.33	.30	20 weeks.....	14.47	9.67
4 weeks.....	.86	.75	24 weeks.....	18.23	11.15
8 weeks.....	3.13	2.68	26 weeks.....	20.18	12.04
12 weeks.....	6.54	5.28	28 weeks.....	21.35	12.48

FEED CONSUMPTION AND COST OF GROWING

The quantity and cost of feed used in raising a flock of 156 Bronze turkeys in Montana in 1934 are shown in tables 3 and 4. These poults (70 males and 86 females) had well-balanced dry mashers (containing 22 percent of protein) before them at all times and scratch grain beginning with the second week. The birds were allowed to range on

2-acre nonirrigated lots after they were 8 weeks of age. The costs were based on local feed prices in Miles City, Mont., in 1934. By using the data in tables 2 and 3, the feed consumption and cost for an average turkey can be estimated for any period of growth.

TABLE 3.—Average feed consumption and cost per pound of gain in 4-week periods for 70 male and 86 female Bronze turkeys in 1934 at Miles City, Mont.

Age	Feed consumed per pound of gain in live weight			Cost of feed for each pound of gain in live weight	Age	Feed consumed per pound of gain in live weight			Cost of feed for each pound of gain in live weight
	Mash	Scratch grain	Total			Mash	Scratch grain	Total	
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Cents</i>		<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Cents</i>
1 to 4 weeks.....	2.44	0.21	2.65	5.9	17 to 20 weeks....	3.05	1.52	4.57	9.8
5 to 8 weeks.....	2.41	.16	2.57	5.7	21 to 24 weeks....	3.09	3.45	6.54	13.5
9 to 12 weeks.....	2.42	.43	2.85	6.1	25 to 28 weeks....	2.46	5.64	8.10	16.1
13 to 16 weeks....	3.47	.42	3.90	8.8					

TABLE 4.—Average feed consumption per bird in 4-week periods for 70 male and 86 female Bronze turkeys in 1934 at Miles City, Mont.

Age	Mash	Scratch grain	Total	Age	Mash	Scratch grain	Total
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>		<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
1 to 4 weeks.....	1.39	0.12	1.51	17 to 20 weeks....	9.05	4.52	13.57
5 to 8 weeks.....	4.45	.29	4.74	21 to 24 weeks....	7.64	8.53	16.17
9 to 12 weeks.....	6.67	1.19	7.86	25 to 28 weeks....	5.19	11.89	17.08
13 to 16 weeks....	9.96	1.21	11.17				

Using the data contained in tables 2 and 3, it will be found that it took approximately 96 pounds of mash and scratch feed to raise a 21-pound tom to 28 weeks of age, and about 57½ pounds of mash and grain to raise a 12½-pound hen to that age, or about 4.5 pounds of feed for each pound of live weight, when practically all feed was furnished. It took about 4 pounds of feed for each pound of live weight up to 24 weeks of age. The birds had access to a moderate sized range lot containing native grasses, but very little feed was obtained from it during the 1934 season.

DEFORMED BREASTBONES

Crooked and dented breastbones in turkeys are common and sometimes cause a considerable loss to growers when the birds are marketed, since a severely crooked or very deeply dented breastbone causes the carcass to be graded as no. 2.

It is generally believed that faulty nutrition causes most of the deformed breastbones, although level roosts narrower than 2½ inches have been known to cause deformities of this kind. If turkeys are supplied with green feed, fed liberally on one of the rations suggested, provided with tilted 2 by 4 roosts or medium-sized poles (see page 35), and have plenty of direct sunlight, there will be few crooked breastbones among them. A small number (from 1

to 2 percent) is to be expected as it seems to be impossible to eliminate them entirely. The addition to the ration of steamed bone meal and limestone grit or oyster shell as a mineral reinforcement is recommended by some poultrymen. However, the various rations, as listed, supply adequate quantities of the bone-building ingredients. Further additions are unnecessary and may even be harmful.

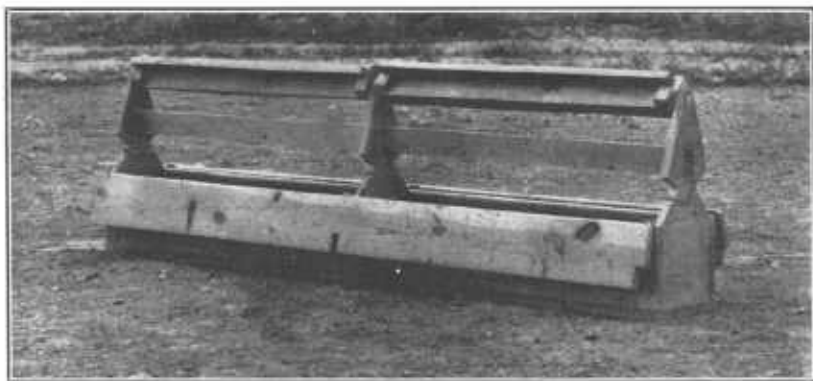


FIGURE 13.—Mash hopper for feeding young turkeys 12 weeks old or older. The end plan of the same hopper is shown in figure 14.

EQUIPMENT FOR RAISING TURKEYS

CONTAINERS FOR FEED AND WATER

During the first 3 or 4 weeks after the poults hatch, two-piece crockery fountains are excellent milk containers. For water, galvanized metal containers are more convenient. When the poults are from 4 to 10 weeks old, water pails, metal troughs, or shallow tin or graniteware pans provided with wire or wooden guards are more satisfactory than fountains. A good method is to place the water or milk outside the wall of the brooder room so that the poults can drink it through a wire screen. From the age of 9 weeks until market age, a supply of running water is preferable, although ordinary water pails set inside the range house on the wire floor or pails or tubs set outside the fence, with openings in the wire for the birds' heads, are satisfactory. Changing the position of the watering devices every few days or setting them on wire-covered platforms will aid in providing sanitary conditions near the watering places where filth is likely to accumulate rapidly. A watertight barrel provided with a drip faucet and a trough also makes a good watering device. Shade should be provided to prevent the drinking water from getting hot. Suitable equipment for feeding mash and scratch feed is shown in figure 12.

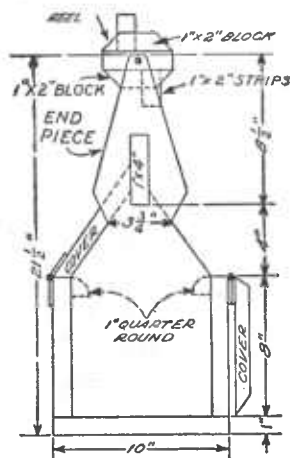


FIGURE 14.—Diagram of end of mash hopper for feeding young turkeys. Side view of same hopper shown in figure 13.

Small trough feeders made of lath (fig. 12, *A*) may be used from the first day in the brooder and until the poults are a week old. Such feeders are made with 1 lath for the bottom, 2 for the sides, small sections for end pieces, and another lath for a guard to keep

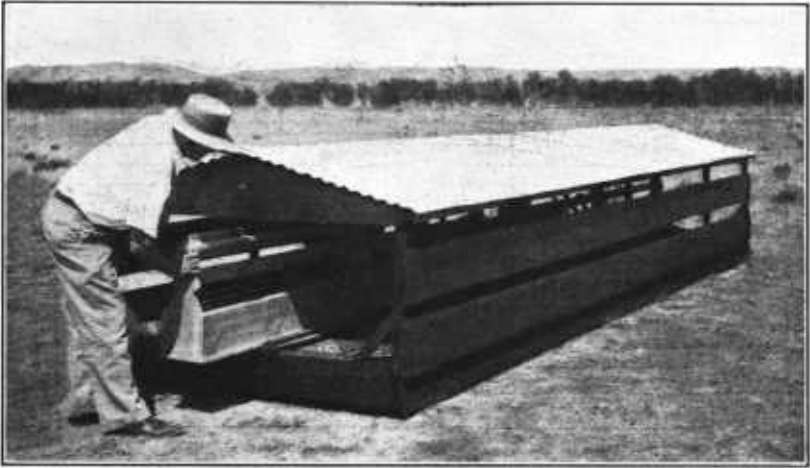


FIGURE 15.—A waste-proof, portable, outdoor shelter for feeder. The wire floor helps to prevent contamination from the soil and the roof provides shelter when the birds are eating.

poults out of the trough. For poults from 8 days to 4 weeks old it is better to use large trough feeders made of $\frac{1}{2}$ - by $2\frac{1}{4}$ -inch boards for the sides with a top guard consisting of a free-turning

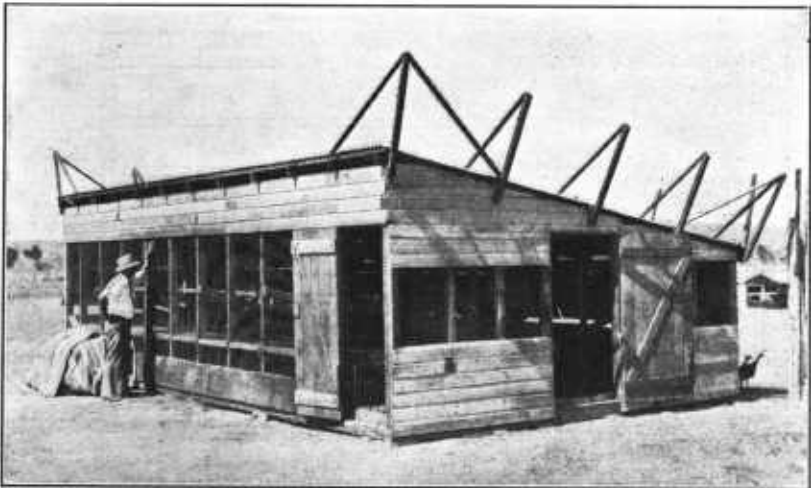


FIGURE 16.—Large range house for turkeys. This type is equipped with a wire-floored alleyway, as shown in figures 17 and 18. The antiflies on the roof prevent turkeys from roosting there.

reel. Baling wire stretched inside the troughs (fig. 12, *C*) aid in preventing waste of feed and also serve as beak cleaners for the birds. To prevent waste, it is better not to fill most trough feeders more than two-thirds full. In the brooder house it is important to

place feeders on a wire platform made of 1-inch mesh, 16-gage wire, and 1- by 4- or 1- by 6-inch boards. Poults 5 to 12 weeks old should have trough feeders made of $\frac{1}{2}$ - by 5-inch boards for the sides, with a free-turning reel at the top. For poults from 12 weeks old to market age the feeders should be even larger, as illustrated in figures 13 and 14.

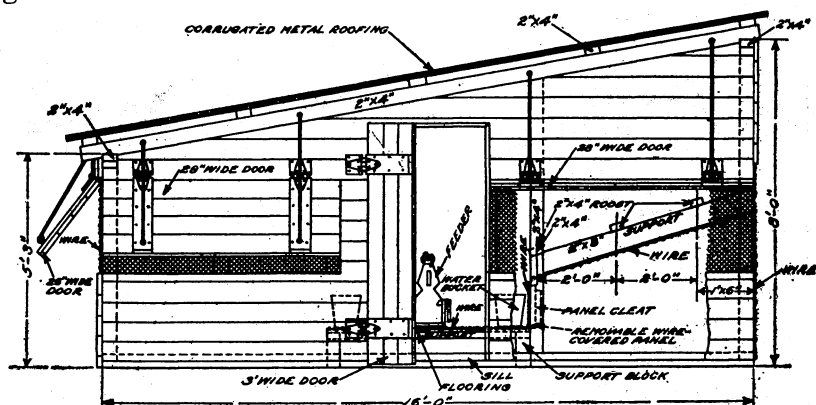


FIGURE 17.—End elevation of turkey range house with alleyway.

After the age of about 12 weeks, and when feeding is done under shelter, use a flat-bottomed trough from 12 to 18 feet long or several short feeders made with a 1- by 10-inch board as a bottom, 1- by 8-inch boards as sides, and with a guard of 1- by 4-inch center piece topped with a free-turning roller or reel (fig. 14). For outside

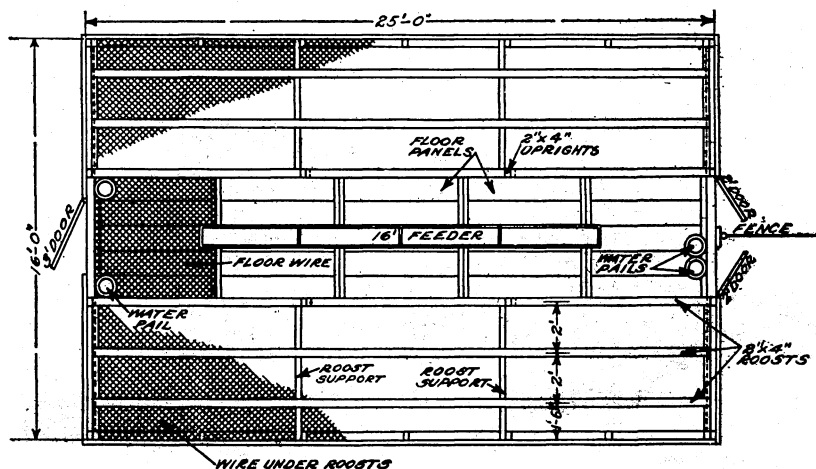


FIGURE 18.—Floor plan of turkey range house with alleyway.

feeding a similar trough is advisable. It should be divided into two sections each 6 to 9 feet long, set on 2- by 8- or 2- by 10-inch skids covered with 1-inch hexagonal mesh, 16-gage wire or heavy gage 1-inch-mesh hardware cloth, and provided with a gable roof and side boards to protect the feed and the birds from sun, wind, and rain (fig. 15). The troughs can be removed to be used as inside

feeders and for replenishing the feed. Two 9-foot feeders are sufficient for 150 to 175 birds. Inside feeding is preferred whenever possible to provide it.

HOUSES AND FENCES

A verminproof, weatherproof roosting shelter for growing poult is an important piece of equipment. A square or rectangular struc-



FIGURE 19.—Interior of 16- by 25-foot range house showing wire floor and wire under roosts. Figure 17 shows the wire nailed on the underside of the roost supports.



FIGURE 20.—This shed-roof range house will accommodate from 130 to 150 growing turkeys to market age. The plan of this house is shown in figure 21.

ture with a shed or gable roof makes a satisfactory range house. A shed roof is more easily constructed. The use of wire guards called "antiflies" will keep turkeys off the roof. Allowing for a 5-foot wire-floored alleyway to hold the feeders and waterers, a house

about 16 feet wide and 25 feet long (figs. 16, 17, 18, and 19) will accommodate 150 to 175 growing turkeys to market age; a similar house about 16 by 18 feet is large enough for 100 birds. Feeding and watering can be done inside. For a permanent house, a height of 5 or $5\frac{1}{2}$ feet at the caves and about 8 feet at the front

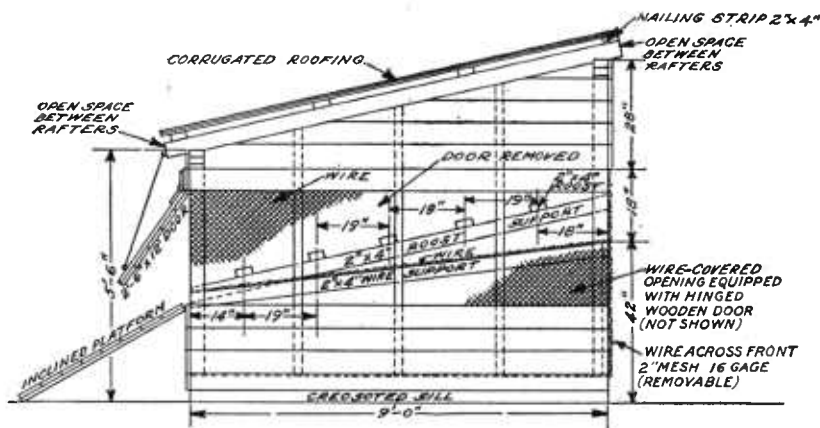


FIGURE 21.—End elevation of range shelter for turkeys. This type is built without an alleyway and measures 9 by 26 feet.

(or the peak, if gable-roofed) is sufficient. If no alleyway is used, a house 9 by 26 feet containing roosts only should care for 130 to 150 turkeys to market age (figs. 20 and 21).

With the latter type of house, feeding and watering must be done outside, preferably with a covered feeder, as shown in figure 15. A

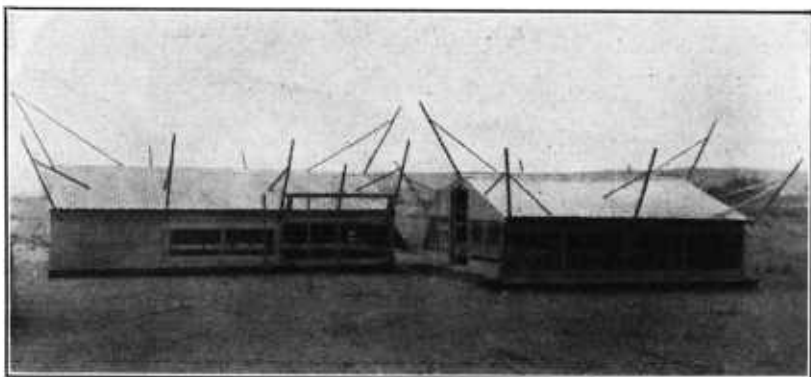


FIGURE 22.—Portable turkey range houses equipped with wire floors and antflies. The house on the left is 16 by 20 feet and has a feed storage room at one end.

cheaper portable coop, not so high and with framework of lighter material, is shown in figure 22. This coop is built on 4- by 10-inch skids and is equipped with raised wire floor and with roosts.

A permanent house should face south or in a southerly direction so that the front is not exposed to storms. Board sides on the north and west are desirable. Practically open-air conditions, combined

with good protection, may be obtained by leaving wire-covered openings about 2 or 2½ feet wide across the north, west, and east sides at about the level of the roosts. These openings should be made closable by shiplap doors that may be partly opened in warm weather and closed during cold weather and storms. The south side may be left entirely open except for 1-inch hexagonal mesh of 16- or 18-gage wire and enough boards to give strength to the building and protect the birds from rainstorms.

As mentioned on page 29, desirable roosts may be made of 2 by 4's with edges beveled and laid flatwise but slightly titled up at about the angle of a quarter-pitch roof in the direction toward which the birds are likely to face. Roosts made of 2 by 4's or other sawed lumber may cause dents in the breastbones if they are laid perfectly flat. Smooth poles 2½ to 5 inches in diameter also make good roosts. Material less than 2½ inches wide is not recommended for turkeys half grown or older. Roosts should be placed preferably 20 to 24 inches apart (center to center), about 14 inches from the wall and lengthwise of the building. Those nearest the back wall of the shelter should be the highest, and each of the others should be about 6 inches lower than the one back of it. This arrangement insures an even distribution of the birds on the roosts without crowding. Allow about 1 foot of roost space per bird as they require as much space as this when approaching market age.

The space beneath the roosts should be fenced off and covered with 1½-inch, 18-gage wire mesh to prevent the birds from getting at the droppings. This wire should be placed either on the under side of the roost supports (fig. 17) or on special wire supports (fig. 21), and it should be 6 to 12 inches below the top of the roosts. When a wire-floored alleyway is used, removable vertical panels made of 1- by 4-inch boards covered with the 1½-inch hexagonal, 18-gage wire mesh should be placed directly under the roosts which border the alleyways in such a way as to close the opening underneath the roosts (fig. 19).

In very dry regions, if the space underneath the roosts and wire floors is entirely enclosed, the droppings may be allowed to accumulate throughout the entire growing season to save labor. In damp climates, however, the droppings should be removed frequently.

Wire floors may be used, as described, in the alleyways of roosting shelters to provide a place for inside feeding and watering and may also be used in the outside yards when close-confinement rearing is practiced. A practical method of construction is to make the floor in removable sections, each about 5 feet square. The framework should be made of 2 by 4's placed on edge, with the top edge beveled to present about three-fourths inch of surface; the center supports may be of 1 by 4's, also placed on edge, spaced 12 to 16 inches apart, and laid lengthwise of the alleyway (fig. 19). This frame should be covered with 1-inch hexagonal, 16-gage wire mesh or chain-link fabric wire. Hardware cloth in a 1-inch mesh made of 14-gage wire is perhaps more satisfactory and will last longer, but the first cost would be greater. The wire may be fastened with eight-penny nails and 1-inch staples alternated, one for each strand of wire, but fastened only to the top or sides of the 2- by 4-inch framework, not to the center supports. The sections should be set loosely in the

alleyway and held 1 inch apart by nails driven into the sides of the framework. Supports made of either 2 by 4 or 2 by 6 inch material should be placed on both sides of the alleyway, directly under the outer framework of the floor panels, and blocked up so as to hold the floor frames 1 foot above the ground.

Since hen turkeys fly well, it is sometimes difficult to keep them in their runways. Clipping the large outer feathers (called primaries) of one wing will do much to prevent the turkeys from flying, but it is usually necessary to put a 3- or 4-foot guard made of 1 by 4 or 2 by 2 inch material and lightweight poultry wire around the edge of the roof of the roosting shelters, on gates, and on the fences themselves for 2 or 3 rods out from the buildings. Whenever practicable, these "antiflies" should be slanted in toward the yard (figs. 16 and 20). Clipping the wings of the toms is undesirable and is usually unnecessary when antiflies are properly constructed.

A 5-foot fence is usually high enough to confine turkeys, except near buildings and over gates, where the fence should be 8 or 9 feet high. Even a 4-foot fence has been reported as satisfactory by some growers. Steel posts and square-mesh poultry fencing of full standard weight make good turkey fences.

PROTECTION AGAINST DOGS

Dogs cause heavy losses among turkeys in many localities. Turkey houses must be well constructed to exclude dogs. Wire of 16-gage to 18-gage weight is necessary, and it must be very tightly nailed. The 16-gage weight should be used for the outside of buildings where it comes close to the ground. Confining the turkeys to their shelters all night and through the early morning hours is frequently a necessary precaution unless an attendant is present or protection is afforded by a good watchdog. Fences for confining poultry are not always entirely dogproof. High roosts, provided by some growers, give protection at night, but in the early morning hours when the turkeys are off the roosts, an attendant should be in the vicinity. Feeding the flock inside the shelter is advantageous when turkeys must be confined during the early morning hours as this greatly increases the feeding period.

DEVICES THAT PREVENT TAIL-FEATHER PICKING

Tail-feather picking seems to begin by the birds' using each others' tail feathers to clean their beaks of mash. Although it does not ordinarily damage the birds for market, the habit ruins their appearance and decreases their salability as breeding stock. It is not always possible to prevent tail-feather picking entirely, especially in flocks raised in confinement or in small range lots, but it may be prevented partially by providing tightly stretched wire in or over the mash feeders. Baling wire stretched tightly or strips of ordinary lightweight poultry wire may be used.

Feeding the mash moist will also aid in preventing tail-feather picking. The kind of mash may also be a factor. A rather coarse mash containing considerable ground corn, some bran, and some coarsely ground oats or barley, including the hulls, seems to be more palatable than a fine mash and is not so likely to clog the beaks of the birds.

RANGE MANAGEMENT OF GROWING TURKEYS

In Minnesota a successful system of moving poults around the colony brooder house has been devised and is giving excellent results. The house is built with a small opening in each side, and a portable frame is so placed that the ground on each side of the house can be used as a small outside run. The birds are allowed to range to the south for from 5 to 10 days; then the house is thoroughly cleaned and the range changed to the west; and so on until the land on all four sides of the house has been utilized. The house is then moved to a clean spot, and the rotation is repeated. After the birds are from 8 to 12 weeks old the house is again moved to a clean place. Turkeys may be raised successfully on a small acreage if they are moved to a clean area each week or two and to an entirely different, clean area each year.

Other systems of yarding have been devised, but the value of most of them has not been proved experimentally. Some system of rotation is necessary on a farm where turkeys are raised regularly. For fenced ranges where the semiconfinement method is to be used, the Minnesota plan is entirely satisfactory for small flocks. For large flocks the use of large yards in the double or triple yarding system has given good results. Under this system, after 8 or 10 weeks of brooding, the poults are put on range, which may be divided into 2 or 3 equal parts. The range used is changed yearly or biennially either by moving the equipment or by having permanent equipment for each range. In the absence of fences, turkeys may be herded so that they are protected from enemies and kept within the clean area allotted to them each season. The use of portable fences and portable roosting shelters enables the grower to move the entire flock to clean range each season or several times each season. This method is practical where large areas of suitable range are available, so that the birds can be reared each season on land that has not been used, or on which no droppings have been spread, for the preceding 2 years. In wet climates it is probably safer to allow a rest of 3 or 4 years. Enough range should be provided so that plenty of growing green feed is available in each yard at all times during the season. When the same ground is used for a whole season, and rainfall or irrigation is adequate, an acre of grass pasture should provide range and green feed for about 100 growing turkeys. An acre of alfalfa or clover would probably provide feed for 150 birds, under favorable conditions.

In arid or semiarid sections, during very dry seasons, it may be advisable to provide fresh, green feed, or legume hay in abundance to discourage the turkeys from eating undesirable green feed on the range. A complete ration must be provided for such conditions.

Where the range is limited to small areas of fenced land, the use of a number of permanent range houses set in a row, preferably 200 feet or more apart, in the middle of the range and along the dividing fence is a practical method of range utilization. The dividing fence should be double so as to provide a neutral area between the two ranges. Under this plan the birds can use one-half of the range for 2 years in succession and the other half for 2 years without the buildings being moved. If individual range lots are desired for each flock of birds, permanent range shelters arranged on either side of a service lane, each with double or triple yards, are a solution to

the clean-range problem. If double yards are used for each house or if the range as a whole is divided into 2 sections, a rotation of 2 seasons of use, followed by 2 seasons of rest may be the best plan. Where 3 yards for each house can be arranged or where the whole range is divided into 3 large yards, each yard can be used for 1 season and allowed 2 seasons of rest.

Under any system of permanent yards, certain sanitary precautions are essential. Among these are the following: (1) Select such a location or modify the one available in such a way that there is as little drainage as possible from the yards that are being used to those that are being rested; (2) each season, or several times each season, remove the accumulations of droppings from the ground around the houses, feeders, and water vessels; (3) grade up around each house with fresh earth each season or whenever it is necessary, to prevent water from standing near the buildings; (4) fill in or drain all depressions so that water does not stand for any length of time anywhere on the range; (5) use antflies and, if necessary, clip one wing of each bird to keep it from flying into and contaminating the yards that are being rested; (6) prevent birds or persons from going in and out of yards that are being rested; (7) move feeders and water vessels frequently, feed and water the birds inside the range shelters on the wire floors, or place the feeders and water vessels outside on roofed wire platforms so that the droppings that accumulate near them will not become sources of infection; (8) use contamination-proof feeders and water vessels; (9) see that flies do not breed extensively in or near the houses and feeders; (10) place wide boards set into the ground an inch or two at the bottom of the fences and extending for about 10 yards out from the buildings to prevent refuse spreading to the adjoining yards.

When birds are herded on free range some growers move the roosts, feeders, and water vessels to clean ground several times each season, whereas others use permanent roosting and feeding quarters and bring the birds back each night. In either case excessive contamination at any one point should be prevented so far as possible.

FATTENING TURKEYS FOR MARKET

In general, the best method of raising turkeys is to keep them growing at a normal rate so that at the age of about 6 months they are in prime market condition, no special fattening period being necessary. Such a method calls for liberal feeding of balanced rations throughout the growing period. A good range will supply a large quantity of feed at a very reasonable cost, but not even the best range will furnish enough of the right kinds of feed to produce large numbers of prime turkeys without supplementary feeding.

In many instances, however, turkey growers believe that it is more profitable to force the birds to forage for most of their livelihood until a few weeks before marketing time. A good plan for fattening these range-grown birds is to begin early in the fall to feed the birds mash and scratch, allowing them all they will eat of both. As they approach maturity they will eat mostly scratch grain. The mash may be fed moist or dry. Milk is an excellent fattening feed, and if plenty of liquid milk is available it may be fed with scratch grain only and no mash. Some turkey raisers feed equal parts of

corn, wheat, and oats during the first part of the fattening season and gradually change to all corn as the weather becomes cooler. This system is satisfactory if plenty of milk can be fed in addition. Without milk or some other high-protein feed, the results are likely to be unsatisfactory. If too heavy feeding of corn alone is begun before the range turkeys become accustomed to it, the disease known as scours often results, especially if new corn is used. Old corn is a much better feed than new corn, but the new crop is safe after it is well matured and dry.

As a general rule, turkeys that have been raised on free range cannot be successfully fattened in close confinement. They may be successfully fattened, however, if they are confined to moderate-sized yards containing growing alfalfa or other green crops or stacks of alfalfa or clover hay. There is no advantage in confining turkeys which have been raised in semiconfinement to smaller quarters for fattening.

MARKETING TURKEYS

The marketing season for the bulk of the turkey crop is usually comparatively short, extending from the middle of November to the latter part of December. There is an increasing demand in the fall and winter and even in late summer for young turkeys. Many turkey raisers sell their birds alive to poultry dealers, who either dress them or ship them alive to city dealers. In sections where turkeys are grown in large numbers, as in Texas, dressing plants have been built by cooperative associations and poultry dealers who collect the live birds and dress them for the various city markets. As soon as possible after reaching the dressing plant, the turkeys are killed, dry-picked, cooled, and packed in barrels or boxes for shipment.

Farmers near the city markets often dress their turkeys and sell them direct either to the consumer or to the city dealer. In territory adjacent to large cities marketing both live and dressed birds at roadside stands has become common.

WHEN TO MARKET

Experiments with Bronze turkeys have indicated that well-fed, young birds of this popular variety are marketed to best advantage at from 24 to 28 weeks of age, if they are in good flesh and reasonably free from short pinfeathers. If they are kept longer than 28 weeks, the cost of maintenance and gains and the extra labor of their care cause the costs of production to rise rapidly. Under ordinary conditions 26 to 28 weeks is the best age for marketing full-fed Bronze turkey toms. For turkeys fed for rapid growth 24 weeks is a more profitable age if the birds are ready for market then, as is often the case with young hens which mature more quickly than the toms. Data obtained on more than 600 birds at the United States Range Livestock Experiment Station at Miles City, Mont., show that at 24 weeks of age the feed cost of producing live turkeys was 1 cent per pound lower than at 26 weeks of age, and 2.5 cents per pound lower than at 28 weeks. These figures, of course, will vary in different years, depending on the price of feeds. Besides this cost for feed the extra labor in caring for the birds, often during unfavorable weather, must be considered.

With the expansion of the turkey industry, the chain stores have become one of the large wholesale buyers of turkeys. They desire various sizes, according to the nature of the patronage in different localities, and as a result create a considerable market demand for hens and small toms. This is particularly true of their Thanksgiving and Christmas trade. Other channels of trade, such as restaurants, hotels, steamships, and railroad lines, prefer large toms. As turkeys become more generally used throughout the year an increase in the trade for small birds may be expected.

SELECTING BIRDS FOR MARKET

Practically all turkeys that are full fed are ready for market at from 26 to 28 weeks of age, and in many cases at 24 weeks, depending on sex, breeding, feeding, and weather. However, with range birds on limited feed, the grower can probably afford to hold his turkeys longer than 26 or 28 weeks, if necessary, because the feed costs were low during the growing period. It is, of course, very important to market only turkeys that are fat and free from small pinfeathers. Sufficient protein and minerals in the feed during the fall months are essential to proper growth and economical gains as well as to proper feather development. A prime turkey, especially a young one, is not expected to be excessively fat, but it must have an even covering of fat so that the skin appears white or yellowish white rather than dark or bluish. The breast must be meaty and the whole body free from small pinfeathers, bruises, and abrasions. Great care should be taken, therefore, not to allow the birds to bruise themselves by flying or running against obstructions; they should be handled gently and not frightened.

WITHHOLDING FEED BEFORE SLAUGHTER

Birds with feed in their crops are usually graded as no. 2 and sold at a lower price because feed in the crop spoils readily, and also detracts from the appearance of the carcass. Mash feed passes out of the crop quickly so that crops will be empty if the mash is removed at dusk on the day before slaughter and no scratch grain fed on that day. If the birds are kept without feed for more than 18 or 24 hours they may eat soil, litter, droppings, or feathers, and thus defeat the main purpose of withholding feed. This applies especially to old hens. If the birds are not to be killed until late afternoon or evening, give them a light feed of mash early in the morning. Scratch grain should be fed only until about 18 hours before slaughter. Feeding should always be planned so that feed is not withheld more than 24 hours. All birds being held for slaughter should have free access to water up to killing time.

KILLING AND PICKING

When the bird is to be killed, hang it up by the feet, holding its head in one hand and taking care not to compress the veins in the neck. Open the mouth and cut the jugular vein far back in the throat, just below the base of the skull. For this purpose use the point of a sharp, narrow-bladed knife. As soon as profuse bleeding begins, thrust the knife up through the groove in the roof of the

mouth and into the rear lobe of the brain at the back of the skull so as to render the bird unconscious. When the correct "stick" is obtained, the bird usually gives a peculiar squawk, the tail feathers spread, and all the feathers are loosened by a quivering of the muscles. After sticking, continue to hold the bird's head and attach a blood cup to the lower jaw. The bird's wings should never be locked, as this often results in their being broken, which usually reduces the bird to a low grade. Likewise, no attempt should be made to hold the bird's wings tightly. Blood cups weighing 5 pounds are needed for large birds, whereas cups weighing 3 to 4 pounds are best for small and medium-sized birds.

In dry picking it is essential that the feathers be plucked immediately after the bird is killed. If the bird has been properly stuck, they come out very easily. First remove the tail and large wing feathers and then the body feathers, leaving the small wing feathers and neck and upper breast feathers until last. Pull out all feathers a few at a time, but do not rub them off as this injures the skin and often lowers the grade. Dry picking can be learned best by personal instructions. The semiscald method of picking turkeys is used in some sections at commercial dressing plants, but nearly all home-dressed turkeys are dry-picked.²

Clean-picked turkeys are now preferred, but a single row of short fan feathers on the last joint of each wing may be left. Leave no feathers on any other part of the body. Remove all pinfeathers, especially from the breast, but do not attempt to dig out pinfeathers too short to be pulled. After picking, snap the blood from the bird's mouth with a quick motion and squeeze the vent to remove any droppings that may be there. The feet, if dirty, should be washed and dried. These methods make for clean carcasses, good grades, and good keeping quality. After picking and chilling the birds, cover the heads with head wraps made of heavy waxed paper, to prevent blood soaking through and smearing the carcasses. Whenever the skin is torn, sew it neatly with white thread.

When birds have been killed with feed in their crops, remove the entire crop. Through a 2- or 3-inch slit in the neck, beginning where the neck joins the body, the crop can be completely loosened and withdrawn, the gullet being cut well below the crop. Then sew the opening with No. 36 white thread. Turn in the edges of the skin so as to make a neat job that will not be noticeable when the bird is put on the market.

According to data on Bronze turkeys, killing and picking after the birds had been starved overnight resulted in a loss of about 9 percent of weight for large birds and 10 percent for small birds. The turkeys were weighed both before and after they were killed and picked and again after they had cooled overnight. The larger birds had the lower percentages of loss in weight and therefore the higher dressing percentages. The weight loss of dressed turkeys while chilling overnight is very small, only about one-sixth of 1 percent. Therefore, practically all the loss in weight that occurs during picking and chilling results from the loss of blood and feathers. The weight loss of turkeys overnight just before slaughter when they received no feed was about 3 percent, on an average,

² Detailed information on killing, grading, and marketing turkeys is given in Farmers' Bulletins 1694, Dressing and Packing Turkeys, and 1815, Grading Dressed Turkeys.

making the total loss from their normal weight, due to withholding feed, picking, and chilling, about 13 percent. When dressed turkeys are drawn, with head and feet removed and giblets replaced, there is a further loss of about 15 percent of the dressed weight.

COOLING

Hanging the birds indoors by the legs for 24 hours or more, or laying them on their backs on a clean surface where the temperature of the air ranges from 30° to 36° F. will properly chill the carcasses. They should be thoroughly chilled but not frozen, since frozen birds

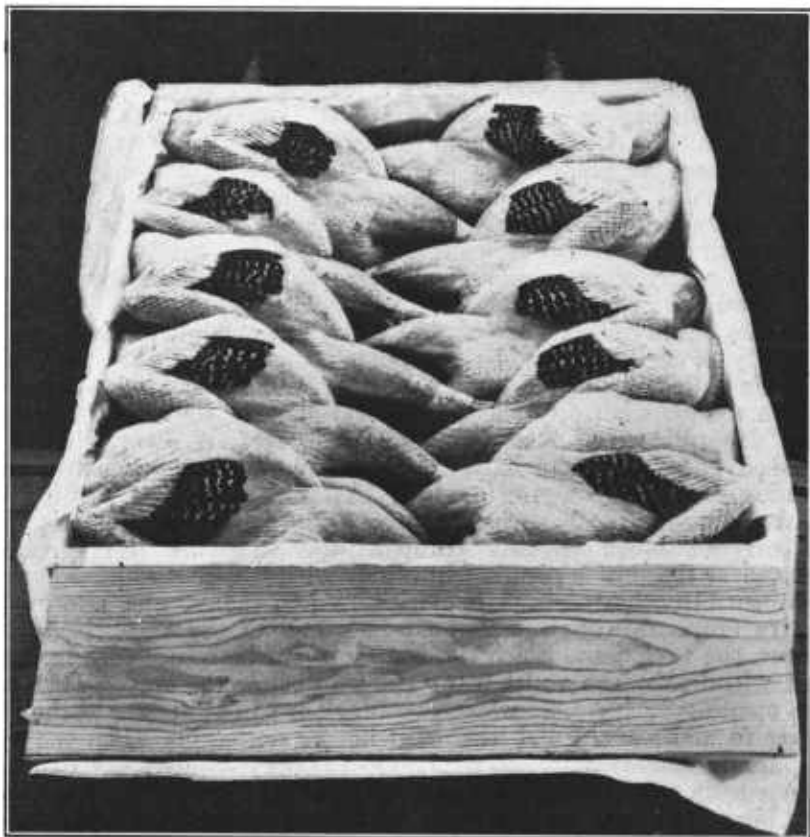


FIGURE 23.—Single-layer box of 10 turkey hens.

sweat and, because of their rigid condition, cannot be packed without great waste of space. In mild weather it is often impossible to cool the carcasses properly without the use of refrigeration or ice water. Cooling in water spoils the appearance of dry-picked carcasses and should be done only as a last resort. A suitable thermometer is an indispensable part of the chilling equipment.

PACKING

Boxes and barrels are generally used for packing dressed turkeys. Packing in clean barrels, while easier and slightly cheaper, is not so satisfactory as box packing, although barrels are often more readily available.

Boxes are greatly preferred by the trade and by organized pools. In box packing, the single-layer pack of 6 to 14 birds, depending on their size, is preferred. The boxes are usually large enough to hold from 10 to 12 medium-sized birds (fig. 23).

When barrels are used, a large size is necessary for large toms. Smaller barrels are suitable for hens and small toms. Line the barrel with white wrapping paper or common white parchment paper. Lay the birds with their backs against the sides of the barrel, and if it is necessary to pack larger birds in the same barrel, place them in the center. When the barrel is full, turn down the paper, take off the top hoop, place a piece of clean burlap over the top, and replace and re nail the hoop over the burlap.

Boxes, barrels, or any other containers used should be free from objectionable odor, as the turkey meat may absorb it.

There is considerable risk for the producer who does not have access to proper refrigerating facilities in shipping dressed turkeys during mild weather. If the birds are to be sold in mild weather, it is safest to market them alive or else sell them dressed to local purchasers as losses from improper cooling of dressed turkeys and from exposure to warm weather during transit are likely to occur. When turkeys are to be shipped only a short distance it may be feasible to chill the dressed birds in ice water and then to pack them in barrels with cracked ice between layers and at each end of the barrel. A top layer of ice placed between two layers of burlap tacked securely over the top of the barrel is desirable. The internal temperature of the turkeys should be reduced to 34° F. before they are shipped.

DRESSED-TURKEY GRADES

Grading systems for dressed turkeys differ somewhat in different markets but, in general, are similar. Greatest uniformity is provided where the United States grades are used. The United States grading system is more comprehensive than other systems and is intended to satisfy the demands of the consumers more fully and to promote more uniform grading.

The United States Government grading system was developed and is sponsored by the Bureau of Agricultural Economics, United States Department of Agriculture. Under this system as now used there are four grades: U. S. Special or U. S. grade AA; U. S. Prime or U. S. grade A; U. S. Choice or U. S. grade B; and U. S. Commercial or U. S. grade C. Each grade is subdivided into four classes according to the age and sex of the birds.

These classes are: Young hen, young tom, old hen, and old tom. The quality specifications for individual birds apply to each class with due allowance for fleshing condition characteristic of its sex and age. Detailed descriptions are provided for each grade. For the U. S. Special grade it is required that turkeys have broad, full-fleshed breasts and that the carcasses be fully covered with fat. The

birds must also have been well bled, carefully dry-picked or semi-scalded, and must be free from bruises, skin tears, and broken joints. The breastbone must be straight or only slightly dented (not more than one-fourth inch in depth). For the U. S. Prime grade it is required that birds be well fleshed, well fattened, and well bled, but they may have slight imperfections such as scattered pinfeathers, slight flesh or skin abrasions, and one disjointed but not broken wing or leg. Slightly curved and slightly dented breastbones, not to exceed one-half inch in depth, are permitted. To grade U. S. Choice, turkeys must have fairly well-fleshed breasts and carcasses fairly well covered with fat. These birds need be only fairly well bled and dressed and may have slight flesh or skin bruises, small skin tears, or larger sewn-up tears, and one broken leg or wing. Turkeys not meeting these grade requirements, including birds poorly fleshed, poorly bled, or slightly deformed, but suitable for food, make up the lowest or U. S. Commercial grade.

Another system of grading in common use in buying dressed turkeys is to make only 2 or 3 grades, except that sometimes the birds within the top grades are divided into classes based on weight and sex. The no. 1 grade usually consists of young toms weighing 12 pounds or more and young and old hens weighing 8 pounds or more, dressed. For this grade the birds must be well finished and free from serious tears, bruises, and severely crooked breastbones. The crops must be empty and the carcasses reasonably free from pinfeathers and reasonably well bled. The no. 2 grade includes all old toms and such young toms, young hens, and old hens as are too light for the no. 1 grade. The no. 2 grade also includes turkeys with severely crooked breastbones, broken wings, bad blemishes, bad tears, bad abrasions, feed in crops, numerous pinfeathers, and birds that have been poorly bled or poorly fleshed. The no. 3 grade includes birds not good enough for the no. 2 grade but still fit for food. These are culls that never should have been marketed. The no. 3 grade is not always used, since turkeys of this kind are often rejected by the buyers. On some markets a medium grade of birds—between the no. 1 and the no. 2 grades—is used.

When graded and packed for market turkeys are further graded as to size, birds of similar weight being placed in the same container, which is labeled according to the grade.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE WHEN THIS PUBLICATION WAS LAST PRINTED

<i>Secretary of Agriculture</i>	HENRY A. WALLACE.
<i>Under Secretary</i>	M. L. WILSON.
<i>Assistant Secretary</i>	HARRY L. BROWN.
<i>Coordinator of Land Use Planning and Director of Information.</i>	M. S. EISENHOWER.
<i>Director of Extension Work</i>	C. W. WARBURTON.
<i>Director of Finance</i>	W. A. JUMP.
<i>Director of Personnel</i>	ROY F. HENDRICKSON.
<i>Director of Research</i>	JAMES T. JARDINE.
<i>Solicitor</i>	MASTIN G. WHITE.
<i>Agricultural Adjustment Administration</i>	H. R. TOLLEY, <i>Administrator.</i>
<i>Bureau of Agricultural Economics</i>	A. G. BLACK, <i>Chief.</i>
<i>Bureau of Agricultural Engineering</i>	S. H. McCrory, <i>Chief.</i>
<i>Bureau of Animal Industry</i>	JOHN R. MOHLER, <i>Chief.</i>
<i>Bureau of Biological Survey</i>	IRA N. GABRIELSON, <i>Chief.</i>
<i>Bureau of Chemistry and Soils</i>	HENRY G. KNIGHT, <i>Chief.</i>
<i>Commodity Exchange Administration</i>	J. W. T. DUVEL, <i>Chief.</i>
<i>Bureau of Dairy Industry</i>	O. E. REED, <i>Chief.</i>
<i>Bureau of Entomology and Plant Quarantine</i>	LEE A. STRONG, <i>Chief.</i>
<i>Office of Experiment Stations</i>	JAMES T. JARDINE, <i>Chief.</i>
<i>Farm Security Administration</i>	W. W. ALEXANDER, <i>Administrator.</i>
<i>Food and Drug Administration</i>	WALTER G. CAMPBELL, <i>Chief.</i>
<i>Forest Service</i>	FERDINAND A. SILCOX, <i>Chief.</i>
<i>Bureau of Home Economics</i>	LOUISE STANLEY, <i>Chief.</i>
<i>Library</i>	CLARIBEL R. BARNETT, <i>Librarian.</i>
<i>Bureau of Plant Industry</i>	E. C. AUCHTER, <i>Chief.</i>
<i>Bureau of Public Roads</i>	THOMAS H. MACDONALD, <i>Chief.</i>
<i>Soil Conservation Service</i>	H. H. BENNETT, <i>Chief.</i>
<i>Weather Bureau</i>	FRANCIS W. REICHELDERFER, <i>Chief.</i>